YAMAHA

YZF-R1 '98

4XV1-AE1

SERVICE MANUAL

EB001000

NOTICE

This manual was produced by the Yamaha Motor Company, Ltd. primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to include all the knowledge of a mechanic in one manual. Therefore, anyone who uses this book to perform maintenance and repairs on Yamaha vehicles should have a basic understanding of mechanics and the techniques to repair these types of vehicles. Repair and maintenance work attempted by anyone without this knowledge is likely to render the vehicle unsafe and unfit for use.

Yamaha Motor Company, Ltd. is continually striving to improve all of its models. Modifications and significant changes in specifications or procedures will be forwarded to all authorized Yamaha dealers and will appear in future editions of this manual where applicable.

NOTE:
Designs and specifications are subject to change without notice.

EB002000

IMPORTANT MANUAL INFORMATION

Particularly important information is distinguished in this manual by the following.

⚠ — The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

⚠ WARNING — Failure to follow WARNING instructions could result in severe injury or death to the motorcycle operator, a bystander or a person checking or repairing the motorcycle.

CAUTION: — A CAUTION indicates special precautions that must be taken to avoid damage to the motorcycle.

NOTE: — A NOTE provides key information to make procedures easier or clearer.

EB003000

HOW TO USE THIS MANUAL

This manual is intended as a handy, easy-to-read reference book for the mechanic. Comprehensive explanations of all installation, removal, disassembly, assembly, repair and check procedures are laid out with the individual steps in sequential order.

① The manual is divided into chapters. An abbreviation and symbol in the upper right corner of each page indicate the current chapter.
Refer to “SYMBOLS”.

② Each chapter is divided into sections. The current section title is shown at the top of each page, except in Chapter 3 (“PERIODIC CHECKS AND ADJUSTMENTS”), where the sub-section title(-s) appears.

③ Sub-section titles appear in smaller print than the section title.

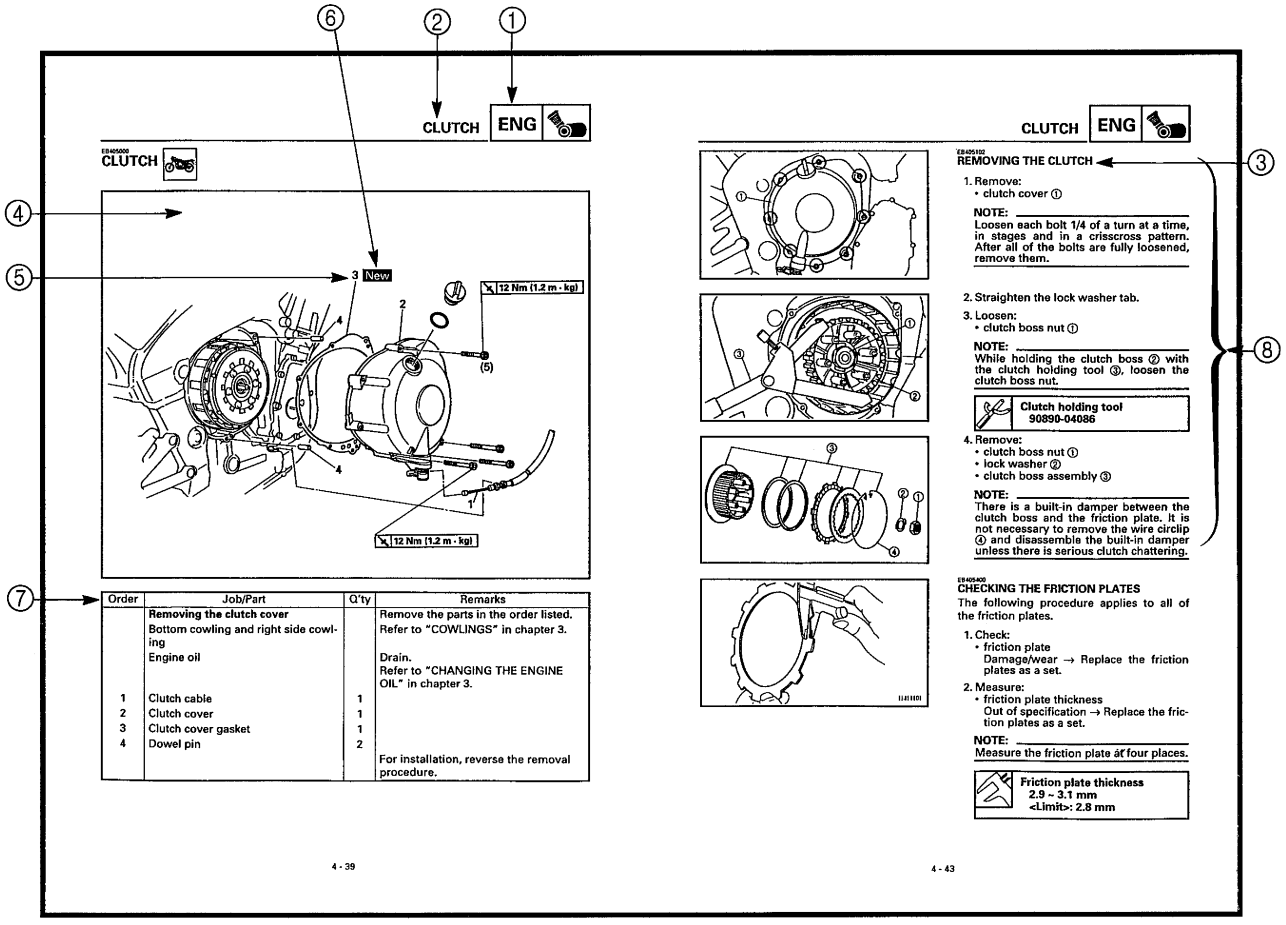
④ To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section.

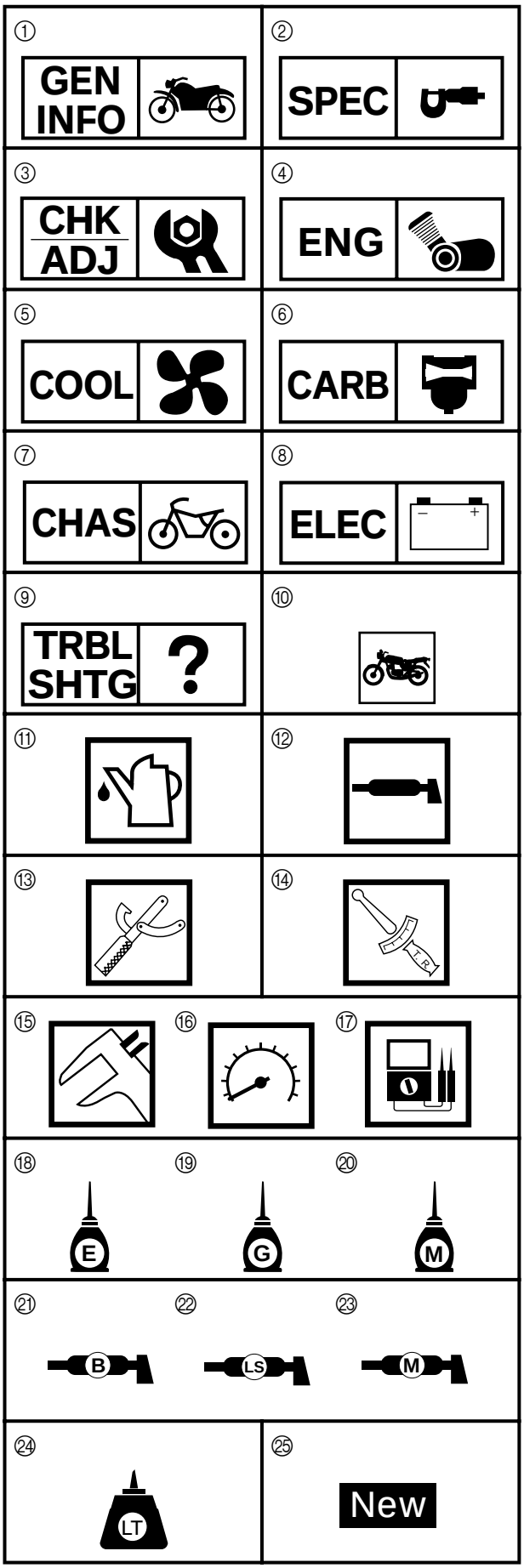
⑤ Numbers are given in the order of the jobs in the exploded diagram. A circled number indicates a disassembly step.

⑥ Symbols indicate parts to be lubricated or replaced.
Refer to “SYMBOLS”.

⑦ A job instruction chart accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.

⑧ Jobs requiring more information (such as special tools and technical data) are described sequentially.





EB004000

SYMBOLS

The following symbols are not relevant to every vehicle.

Symbols ① to ⑨ indicate the subject of each chapter.

① General information
② Specifications
③ Periodic checks and adjustments
④ Engine
⑤ Cooling system
⑥ Carburetor(-s)
⑦ Chassis
⑧ Electrical system
⑨ Troubleshooting

Symbols ⑩ to ⑰ indicate the following.

⑩ Serviceable with engine mounted
⑪ Filling fluid
⑫ Lubricant
⑬ Special tool
⑭ Tightening torque
⑮ Wear limit, clearance
⑯ Engine speed
⑰ Electrical data

Symbols ⑱ to ㉓ in the exploded diagrams indicate the types of lubricants and lubrication points.

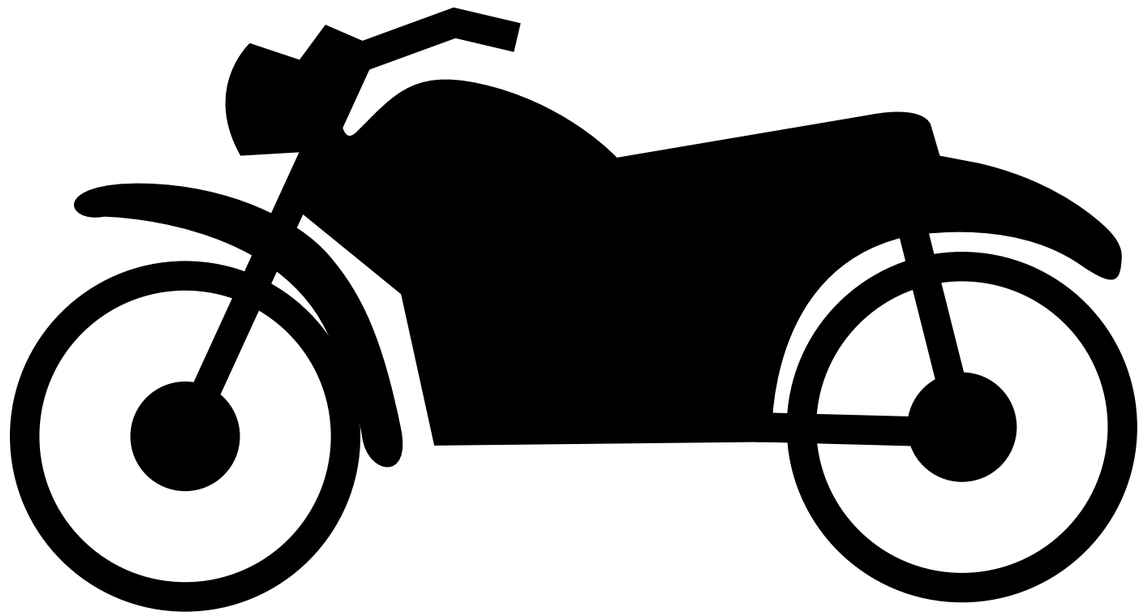
⑱ Engine oil
⑲ Gear oil
⑳ Molybdenum disulfide oil
㉑ Wheel bearing grease
㉒ Lithium soap base grease
㉓ Molybdenum disulfide grease

Symbols ㉔ to ㉕ in the exploded diagrams indicate the following.

㉔ Apply locking agent (LOCTITE®)
㉕ Replace the part

CHAPTER TITLES

GENERAL INFORMATION	 GEN INFO 1
SPECIFICATIONS	 SPEC 2
PERIODIC CHECKS AND ADJUSTMENTS	 CHK / ADJ 3
ENGINE	 ENG 4
COOLING	 COOL 5
CARBURETION	 CARB 6
CHASSIS	 CHAS 7
ELECTRICAL	 ELEC 8
TROUBLESHOOTING	? TRBL SHTG 9



GEN INFO

1

CHAPTER 1.
GENERAL INFORMATION

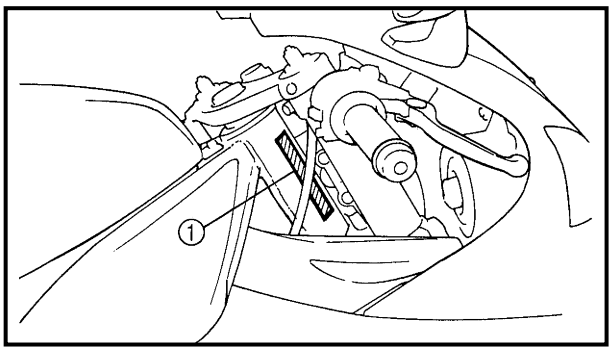
MOTORCYCLE IDENTIFICATION 1-1
VEHICLE IDENTIFICATION NUMBER 1-1
MODEL CODE 1-1

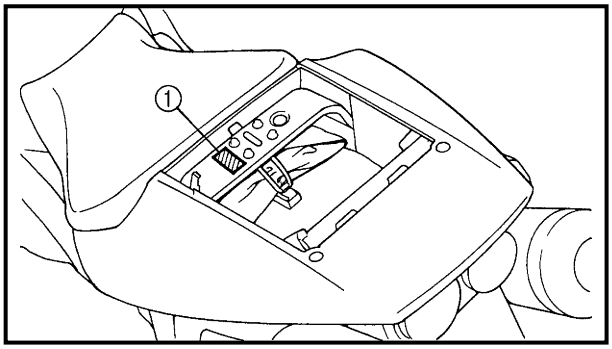
IMPORTANT INFORMATION 1-2
PREPARATION FOR REMOVAL AND DISASSEMBLY 1-2
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CIRCLIPS 1-3

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GENERAL INFORMATION

MOTORCYCLE IDENTIFICATION

EB100010

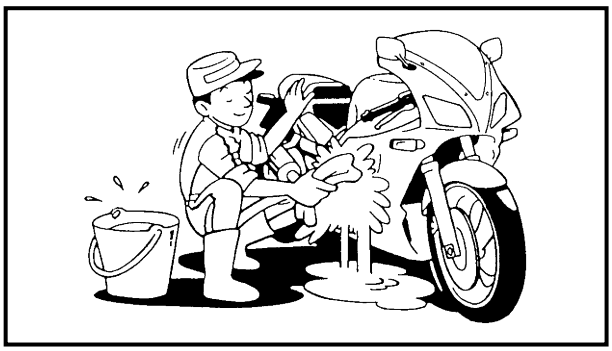
VEHICLE IDENTIFICATION NUMBER

The vehicle identification number ① is stamped into the right side of the steering head pipe.

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MODEL CODE

The model code label ① is affixed to the frame. This information will be needed to order spare parts.

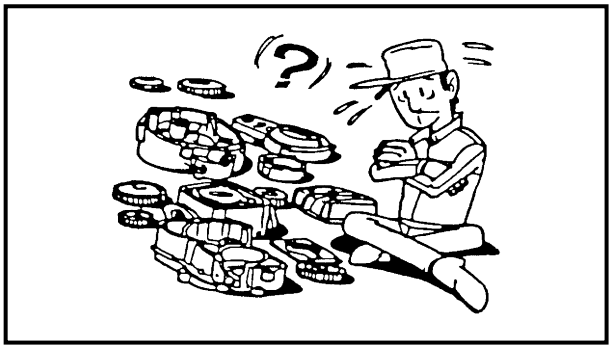


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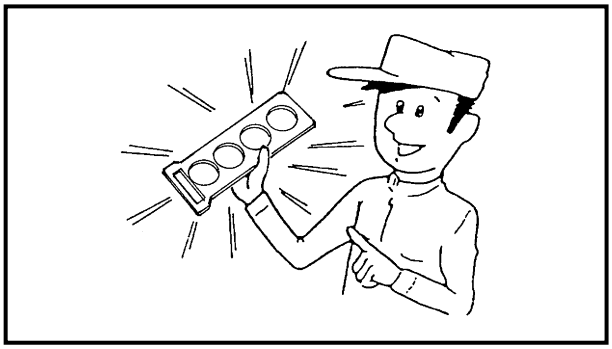
IMPORTANT INFORMATION

PREPARATION FOR REMOVAL AND DISASSEMBLY

1. Before removal and disassembly, remove all dirt, mud, dust, and foreign material.



2. Use only the proper tools and cleaning equipment.
 Refer to "SPECIAL TOOLS".
3. When disassembling, always keep mated parts together. This includes gears, cylinders, pistons and other parts that have been "mated" through normal wear. Mated parts must always be reused or replaced as an assembly.
4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.



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REPLACEMENT PARTS

Use only genuine Yamaha parts for all replacements. Use oil and grease recommended by Yamaha for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.

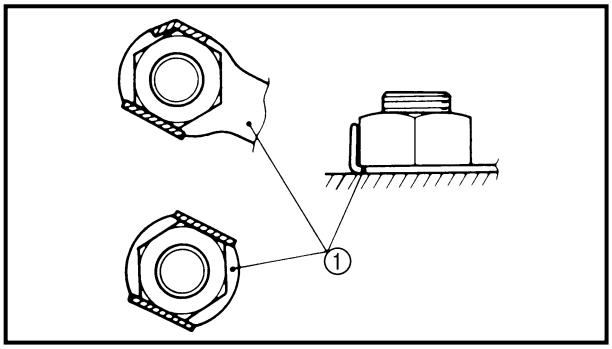
EB102020

GASKETS, OIL SEALS AND O-RINGS

1. When overhauling the engine, replace all gaskets, seals, and O-rings. All gasket surfaces, oil seal lips, and O-rings must be cleaned.
2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.

USING A DYNAMOMETER

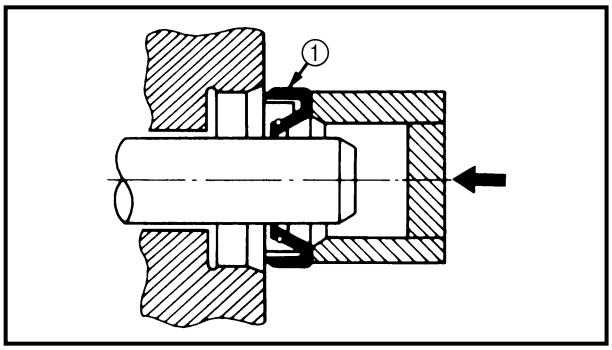
The YZF-R1 has a carbon muffler that may change color when exposed to high temperatures. Therefore, when using a dynamometer always use a fan to cool the muffler.



EB102030

LOCK WASHERS/PLATES AND COTTER PINS

After removal, replace all lock washers/plates ① and cotter pins. After the bolt or nut has been tightened to specification, bend the lock washer tabs and the cotter pin ends along a flat of the bolt or nut.



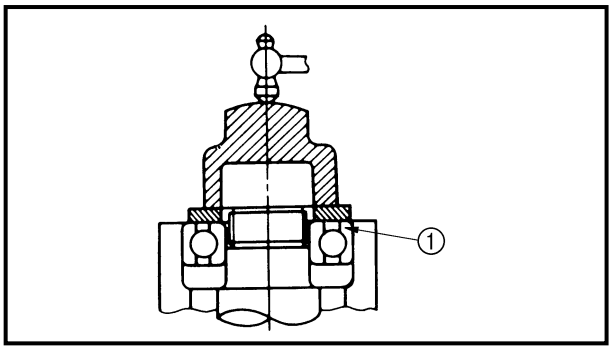
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BEARINGS AND OIL SEALS

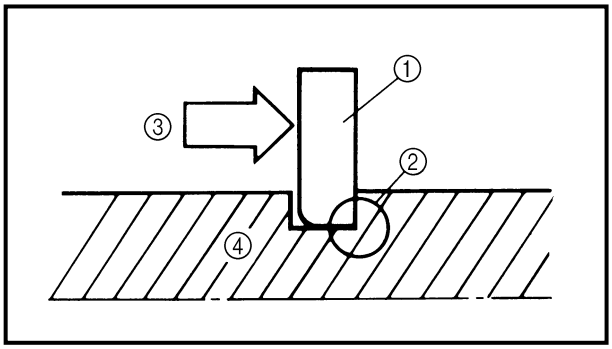
1. Install bearings and oil seals so that the manufacturer's marks or numbers are visible. When installing oil seals, lubricate the oil seal lips with a light coat of lithium soap base grease. Oil bearings liberally when installing, if appropriate.
 ① Oil seal

CAUTION:

Do not spin the bearing with compressed air because this will damage the bearing surfaces.



① Bearing



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CIRCLIPS

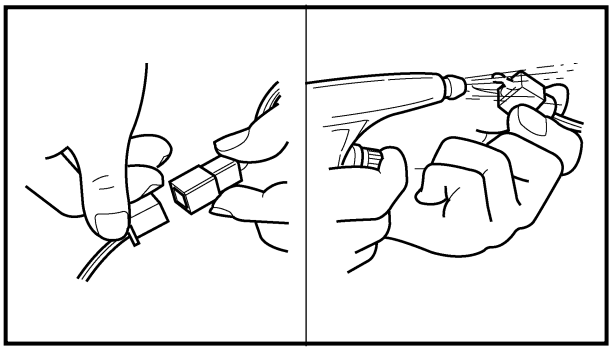
Before reassembly, check all circlips carefully and replace damaged or distorted circlips. Always replace piston pin clips after one use. When installing a circlip ①, make sure that the sharp-edged corner ② is positioned opposite the thrust ③ that the circlip receives.

④ Shaft

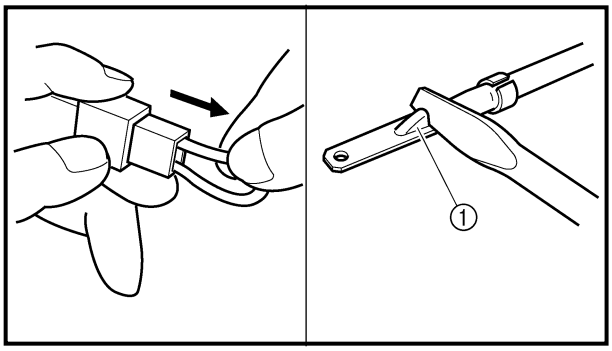
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CHECKING THE CONNECTIONS

Check the leads, couplers, and connectors for stains, rust, moisture, etc.

1. Disconnect:
 • lead
 • coupler
 • connector

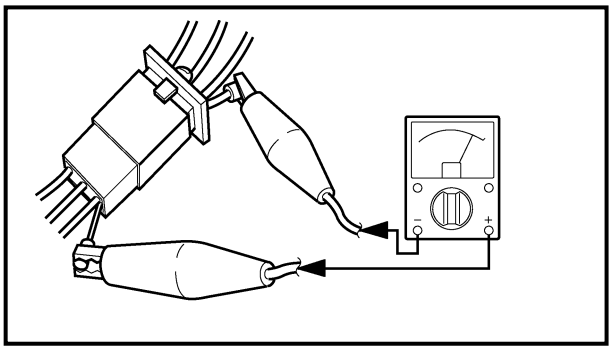


2. Check:
 • lead
 • coupler
 • connector
 Moisture → Dry with an air blower.
 Rust/stains → Connect and disconnect several times.



3. Check:
 • all connections
 Loose connection → Connect properly.

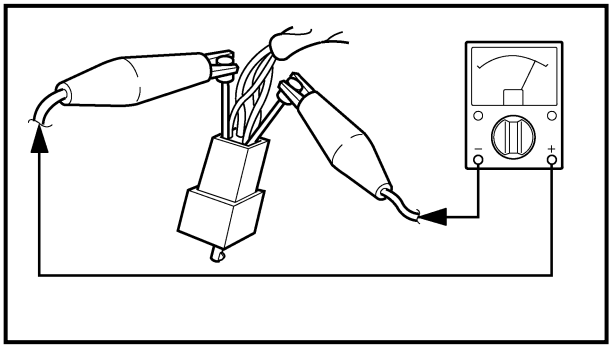
NOTE:
If the pin ① on the terminal is flattened, bend it up.



4. Connect:
 • lead
 • coupler
 • connector

NOTE:
Make sure that all connections are tight.

5. Check:
 • continuity
 (with the pocket tester)

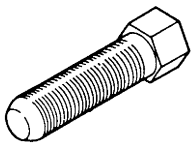
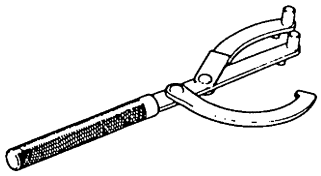
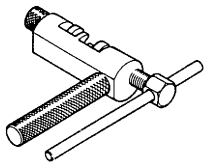
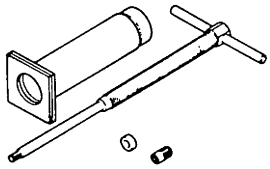
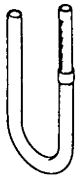
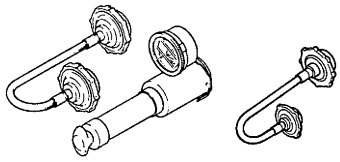
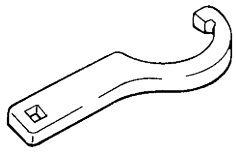
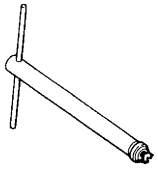


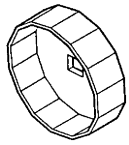
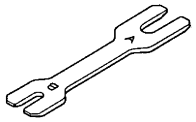
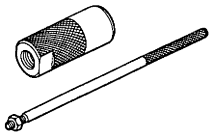
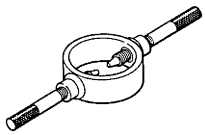
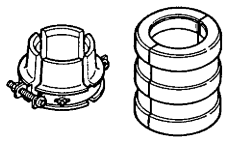
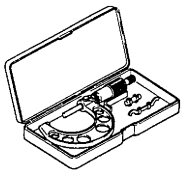
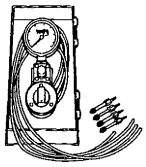
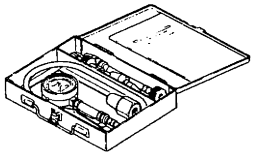
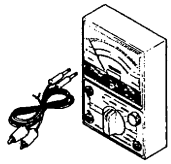
	**Pocket tester** **90890-03112**

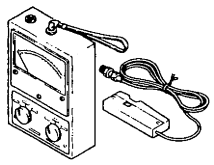
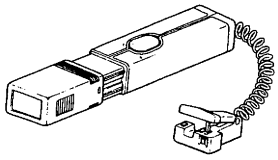
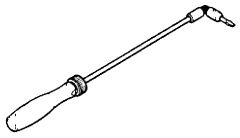
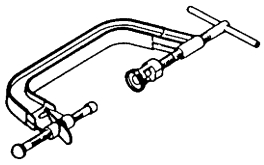
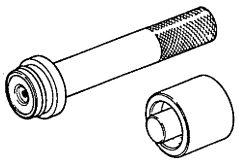
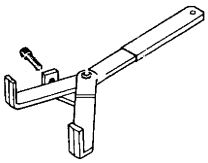
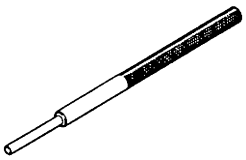
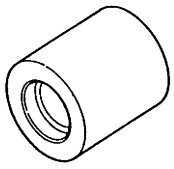
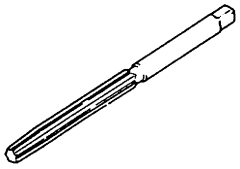
NOTE:
- If there is no continuity, clean the terminals.
- When checking the wire harness, perform steps (1) to (3).
- As a quick remedy, use a contact revitalizer available at most part stores.

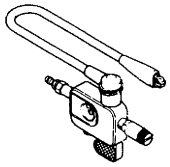
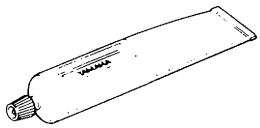
EB104000
SPECIAL TOOLS

The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques.
When placing an order, refer to the list provided below to avoid any mistakes.

Tool No.	Tool name/Function	Illustration
90890-01080	Flywheel puller This tool is used to remove the generator rotor.	
90890-01235	Rotor holding tool This tool is used to hold the generator rotor when removing or installing the generator rotor bolt or pickup coil rotor bolt.	
90890-01286	Drive chain cutter This tool is used to remove the drive chain.	
90890-01304	Piston pin puller This tool is used to remove the piston pins.	
90890-01312	Fuel level gauge This tool is used to measure the fuel level in the float chamber.	
Radiator cap tester 90890-01325 Adapter 90890-01352	Radiator cap tester Adapter These tools are used to check the cooling system.	
90890-01403	Steering nut wrench This tool is used to loosen or tighten the steering stem ring nuts.	
90890-01423	Damper rod holder This tool is used to hold the damper rod assembly when loosening or tightening the damper rod assembly bolt.	

Tool No.	Tool name/Function	Illustration
90890-01426	Oil filter wrench This tool is needed to loosen or tighten the oil filter cartridge.	
90890-01434	Rod holder This tool is used to support the damper adjusting rod.	
Rod puller 90890-01437 Rod puller attachment 90890-01436	Rod puller Rod puller attachment These tools are used to pull up the front fork damper rod.	
90890-01441	Fork spring compressor This tool is used to disassemble or assemble the front fork legs.	
90890-01442	Fork seal driver This tool is used to install the front fork's oil seal and dust seal.	
90890-03008	Micrometer This tool is used to measure the piston skirt diameter.	
Vacuum gauge 90890-03094 Vacuum gauge attachment 90890-03060	Vacuum gauge Vacuum gauge attachment This gauge is used to synchronize the carburetors.	
Compression gauge 90890-03081 Adapter 90890-04136	Compression gauge Adapter These tools are used to measure engine compression.	
90890-03112	Pocket tester This tool is used to check the electrical system.	

Tool No.	Tool name/Function	Illustration
90890-03113	Engine tachometer This tool is used to check engine speed.	
90890-03141	Timing light This tool is used to check the ignition timing.	
90890-03158	Carburetor angle driver This tool is used to turn the pilot screw when adjusting the engine idling speed.	
Valve spring compressor 90890-04019 Attachment 90890-04108 90890-04114	Valve spring compressor Attachment These tools are used to remove or install the valve assemblies.	
Middle driven shaft bearing driver 90890-04058 Mechanical seal installer 90890-04078	Middle driven shaft bearing driver Mechanical seal installer These tools are used to install the water pump seal.	
90890-04086	Clutch holding tool This tool is used to hold the clutch boss when removing or installing the clutch boss nut.	
90890-04111 90890-04116	Valve guide remover This tool is used to remove or install the valve guides.	
90890-04112 90890-04117	Valve guide installer This tool is used to install the valve guides.	
90890-04113 90890-04118	Valve guide reamer This tool is used to rebore the new valve guides.	

Tool No.	Tool name/Function	Illustration
90890-06754	Ignition checker This tool is used to check the ignition system components.	
90890-85505	Yamaha bond No. 1215 This bond is used to seal two mating surfaces (e.g., crankcase mating surfaces).	



SPEC 2

CHAPTER 2.
SPECIFICATIONS

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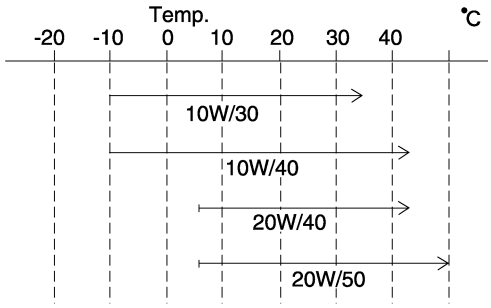
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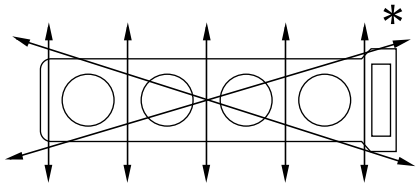
SPECIFICATIONS

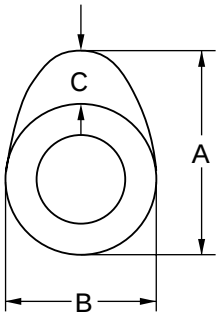
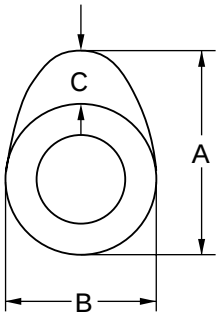
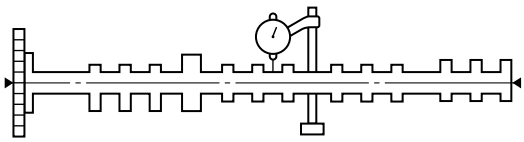
GENERAL SPECIFICATIONS

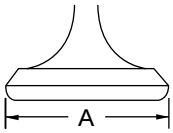
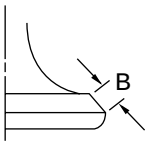
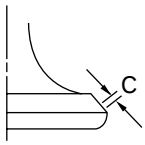
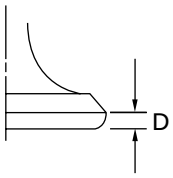
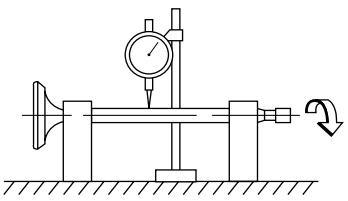
Item	Standard	Limit
Dimensions		
Overall length	2,035 mm (except for N, S, SF)	----
	2,095 mm (for N, S, SF)	----
Overall width	695 mm	----
Overall height	1,095 mm	----
Seat height	815 mm	----
Wheelbase	1,395 mm	----
Minimum ground clearance	140 mm	----
Minimum turning radius	3,400 mm	----
Weight		
Wet (with oil and a full fuel tank)	198 kg	----
Dry (without oil and fuel)	177 kg	----
Maximum load (total of cargo, rider, passenger, and accessories)	197 kg	----

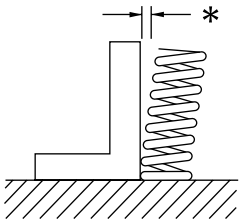
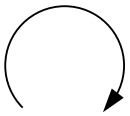
ENGINE SPECIFICATIONS

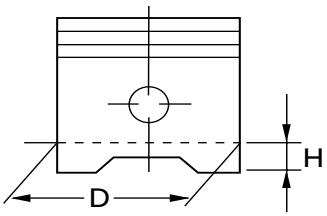
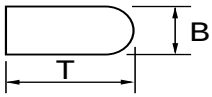
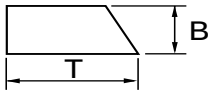
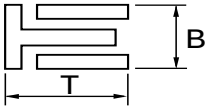
Item	Standard	Limit
Engine		
Engine type	Liquid-cooled, 4-stroke, DOHC	----
Displacement	998 cm^3	----
Cylinder arrangement	Forward-inclined parallel 4-cylinder	----
Bore × stroke	74 × 58 mm	----
Compression ratio	11.8:1	----
Engine idling speed	1,050 ~ 1,150 r/min	----
Vacuum pressure at engine idling speed	29.3 kPa (220 mm Hg)	----
Standard compression pressure (at sea level)	1,450 kPa (14.5 kgf/cm^2) at 400 r/min	----
Fuel		
Recommended fuel	Regular gasoline	----
Fuel tank capacity		
Total (including reserve)	18 L	----
Reserve only	5.5 L	----
Engine oil		
Lubrication system	Wet sump	----
Recommended oil		----
	SAE20W40SE or SAE10W30SE	
Quantity		
Total amount	3.6 L	----
Without oil filter cartridge replacement	2.7 L	----
With oil filter cartridge replacement	2.9 L	----
Oil pressure (hot)	45 kPa at 1,100 r/min (0.45 kgf/cm^2 at 1,100 r/min)	----
Relief valve opening pressure	490 ~ 570 kPa (4.9 ~ 5.7 kgf/cm^2)	----

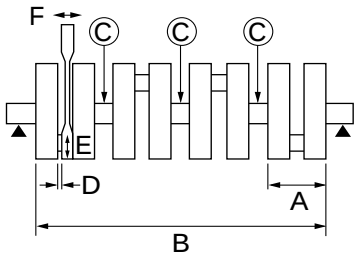
Item	Standard	Limit
Oil filter		
Oil filter type	Cartridge (paper)	----
Bypass valve opening pressure	180 ~ 220 kPa (1.8 ~ 2.2 kgf/cm^2)	----
Oil pump		
Oil pump type	Trochoidal	----
Inner-rotor-to-outer-rotor-tip clearance	0.09 ~ 0.15 mm	----
Outer-rotor-to-oil-pump-housing clearance	0.03 ~ 0.08 mm	----
Cooling system		
Radiator capacity	2.55 L	
Radiator cap opening pressure	95 ~ 125 kPa (0.95 ~ 1.25 kgf/cm^2)	----
Radiator core		
Width	340 mm	----
Height	298 mm	----
Depth	24 mm	----
Coolant reservoir		
Capacity	0.45 L	----
Water pump		
Water pump type	Single-suction centrifugal pump	----
Reduction ratio	68/43 × 28/28 (1.581)	----
Max. impeller shaft tilt	----	0.15 mm
Starting system type	Electric starter	
Spark plugs		
Model (manufacturer) × quantity	CR9E/U27ESR-N (NGK/DENSO) × 4	----
Spark plug gap	0.7 ~ 0.8 mm	----
Cylinder head		
Max. warpage	----	0.1 mm
		

Item	Standard	Limit
Camshafts		
Drive system	Chain drive (right)	----
Camshaft cap inside diameter	24.500 ~ 24.521 mm	----
Camshaft journal diameter	24.437 ~ 24.450 mm	----
Camshaft-journal-to-camshaft-cap clearance	0.050 ~ 0.084 mm	----
Intake camshaft lobe dimensions		
		
Measurement A	32.5 ~ 32.6 mm	32.4 mm
Measurement B	24.95 ~ 25.05 mm	24.85 mm
Measurement C	7.45 ~ 7.65 mm	----
Exhaust camshaft lobe dimensions		
		
Measurement A	32.95 ~ 33.05 mm	32.85 mm
Measurement B	24.95 ~ 25.05 mm	24.85 mm
Measurement C	7.75 ~ 7.95 mm	----
Max. camshaft runout	----	0.03 mm
		

Item	Standard	Limit	
Timing chain			
Model/number of links	RH2015 / 130	----	
Tensioning system	Automatic	----	
Valves, valve seats, valve guides			
Valve clearance (cold)			
Intake	0.11 ~ 0.20 mm	----	
Exhaust	0.21 ~ 0.30 mm	----	
Valve dimensions			
 Head Diameter	 Face Width	 Seat Width	 Margin Thickness
Valve head diameter A			
Intake	22.9 ~ 23.1 mm	----	
Exhaust	24.4 ~ 24.6 mm	----	
Valve face width B			
Intake	1.76 ~ 2.90 mm	----	
Exhaust	1.76 ~ 2.90 mm	----	
Valve seat width C			
Intake	0.9 ~ 1.1 mm	----	
Exhaust	0.9 ~ 1.1 mm	----	
Valve margin thickness D			
Intake	0.5 ~ 0.9 mm	----	
Exhaust	0.5 ~ 0.9 mm	----	
Valve stem diameter			
Intake	3.975 ~ 3.900 mm	3.945 mm	
Exhaust	4.460 ~ 4.475 mm	4.43 mm	
Valve guide inside diameter			
Intake	4.000 ~ 4.012 mm	4.05 mm	
Exhaust	4.500 ~ 4.512 mm	4.55 mm	
Valve-stem-to-valve-guide clearance			
Intake	0.010 ~ 0.037 mm	0.08 mm	
Exhaust	0.025 ~ 0.052 mm	0.1 mm	
Valve stem runout	----	0.01 mm	
			
Valve seat width			
Intake	0.9 ~ 1.1 mm	----	
Exhaust	0.9 ~ 1.1 mm	----	

Item	Standard	Limit
Valve springs		
Free length		
Intake	38.9 mm	----
Exhaust	40.67 mm	----
Installed length (valve closed)		
Intake	34.5 mm	----
Exhaust	35 mm	----
Compressed spring force (installed)		
Intake	82 ~ 96 N (8.36 ~ 9.79 kgf)	----
Exhaust	110 ~ 126 N (11.22 ~ 12.85 kgf)	----
Spring tilt		
		
Intake	----	2.5° / 1.7 mm
Exhaust	----	2.5° / 1.8 mm
Winding direction (top view)		
Intake	Clockwise	----
Exhaust	Clockwise	----
		
Cylinders		
Cylinder arrangement	Forward-inclined, parallel 4-cylinder	----
Bore × stroke	74 × 58 mm	----
Compression ratio	11.8:1	----
Bore	74.00 ~ 74.010 mm	----
Max. taper	----	0.05 mm
Max. out-of-round	----	0.05 mm

Item	Standard	Limit
Pistons		
Piston-to-cylinder clearance	0.03 ~ 0.055 mm	0.12 mm
Diameter D	73.955 ~ 73.970 mm	----
		
Height H	5 mm	----
Piston pin bore (in the piston)		
Diameter	17.002 ~ 17.013 mm	----
Offset	0.5 mm	----
Offset direction	Intake side	----
Piston pins		
Outside diameter	16.991 ~ 17.000 mm	----
Piston-pin-to-piston-pin-bore clearance	0.002 ~ 0.022 mm	0.072 mm
Piston rings		
Top ring		
		
Ring type	Barrel	----
Dimensions (B × T)	0.90 × 2.75 mm	----
End gap (installed)	0.19 ~ 0.31 mm	----
Ring side clearance	0.030 ~ 0.065 mm	----
2nd ring		
		
Ring type	Taper	----
Dimensions (B × T)	0.8 × 2.8 mm	----
End gap (installed)	0.30 ~ 0.45 mm	----
Ring side clearance	0.020 ~ 0.055 mm	----
Oil ring		
		
Dimensions (B × T)	1.5 × 2.6 mm	----
End gap (installed)	0.10 ~ 0.35 mm	----

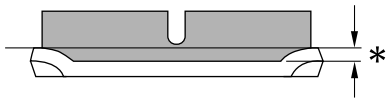
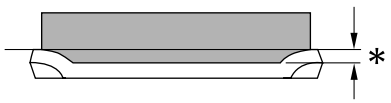
Item	Standard	Limit
Connecting rods		
Crankshaft-pin-to-big-end-bearing clearance	0.016 ~ 0.040 mm	----
Bearing color code	–1 = Violet 0 = White 1 = Blue 2 = Black	----
Crankshaft		
		
Width A	52.40 ~ 57.25 mm	----
Width B	300.75 ~ 302.65 mm	----
Max. runout C		0.03 mm
Big end side clearance D	0.160 ~ 0.262 mm	----
Crankshaft-journal-to-crankshaft-journal-bearing clearance	0.004 ~ 0.028 mm	----
Bearing color code	–1 = Pink/violet 0 = Pink/white 1 = Pink/blue 2 = Pink/black 3 = Pink/brown	----
Clutch		
Clutch type	Wet, multiple disc	----
Clutch release method	Rack and pinion (pull rod type)	----
Clutch release method operation	Cable operation	----
Operation	Right-foot operation	----
Clutch cable free play (at the end of the clutch lever)	10 ~ 15 mm	----
Friction plates		
Thickness	2.9 ~ 3.1 mm	2.8 mm
Plate quantity	8	----
Clutch plates		
Thickness	1.9 ~ 2.1 mm	----
Plate quantity	7	----
Max. warpage	----	0.1 mm
Clutch springs		
Free length	6.5 mm	----
Spring quantity	1 spring per valve	----

Item	Standard	Limit
Transmission		
Transmission type	Constant mesh, 6-speed	----
Primary reduction system	Spur gear	----
Primary reduction ratio	68/43 (1.581)	----
Secondary reduction system	Chain drive	----
Secondary reduction ratio	43/16 (2.688)	----
Operation	Left-foot operation	----
Gear ratios		
1st gear	39/15 (2.600)	----
2nd gear	35/19 (1.842)	----
3rd gear	30/20 (1.500)	----
4th gear	28/21 (1.333)	----
5th gear	30/25 (1.200)	----
6th gear	29/26 (1.115)	----
Max. main axle runout	----	0.08 mm
Max. drive axle runout	----	0.08 mm
Shifting mechanism		
Shift mechanism type	Shift drum	----
Max. shift fork guide bar bending	----	0.1 mm
Installed shift rod length	305 mm	----
Air filter type	Dry element	----
Fuel pump		
Pump type	Electrical	----
Model (manufacturer)	4SV (MITSUBISHI)	----
Output pressure	20 kPa (0.2 kgf/cm^2)	----
Carburetors		
Model (manufacturer) × quantity	BDSR40 (MIKUNI) × 4	----
Throttle cable free play (at the flange of the throttle grip)	3 ~ 5 mm	----
ID mark	4XV1 00	----
Main jet	#130	----
Main air jet	Carburetors 1 and 4: #60 Carburetors 2 and 3: #65	----
Jet needle	6DEY5-53-3	----
Needle jet	P-0	----
Pilot air jet	#120	----
Pilot outlet	1.0	----
Pilot jet	#17.5	----
Bypass 1	0.8	----
Bypass 2	0.9	----
Bypass 3	0.8	----
Pilot screw turns out	2.5	----
Valve seat size	1.5	----

Item	Standard	Limit
Starter jet 1	#35	----
Starter jet 2	0.7	----
Butterfly valve size	#100	----
Fuel level (below the line on the float chamber)	4.1 ~ 5.1 mm	----
Max. EXUP cable free play (at the EXUP valve pulley)	1.5 mm	----

CHASSIS SPECIFICATIONS

Item	Standard	Limit
Frame		
Frame type	Diamond	----
Caster angle	24°	----
Trail	92 mm	----
Front wheel		
Wheel type	Cast wheel	----
Rim		
Size	17 × MT3.50	----
Material	Aluminum	----
Wheel travel	135 mm	----
Wheel runout		
Max. radial wheel runout	----	1 mm
Max. lateral wheel runout	----	0.5 mm
Rear wheel		
Wheel type	Cast wheel	----
Rim		
Size	17 × MT6.00	----
Material	Aluminum	----
Wheel travel	130 mm	----
Wheel runout		
Max. radial wheel runout	----	1 mm
Max. lateral wheel runout	----	0.5 mm
Front tire		
Tire type	Tubeless	----
Size	120/70 ZR17 (58W)	----
Model (manufacturer)	MEZ3 FRONT (METZELER) (for GB) TX15 (MICHELIN) (for N, D, NL, B, E, P, I, GR)	----
Tire pressure (cold)		
0 ~ 90 kg	250 kPa (2.5 kg/cm^2, 2.5 bar)	----
90 ~ 197 kg	250 kPa (2.5 kg/cm^2, 2.5 bar)	----
High-speed riding	250 kPa (2.5 kg/cm^2, 2.5 bar)	----
Min. tire tread depth	----	1.6 mm

Item	Standard	Limit
Rear tire		
Tire type	Tubeless	----
Size	190/50 ZR17 (73W)	----
Model (manufacturer)	MEZ3 (METZELER) (for GB) TX25 (MICHELIN) (for N, D, NL, B, E, P, I, GR)	----
Tire pressure (cold)		
0 ~ 90 kg	250 kPa (2.5 kg/cm^2, 2.5 bar)	----
90 ~ 197 kg	290 kPa (2.9 kg/cm^2, 2.9 bar)	----
High-speed riding	250 kPa (2.5 kg/cm^2, 2.5 bar)	----
Min. tire tread depth	----	1.6 mm
Front brakes		
Brake type	Dual-disc brake	----
Operation	Right-hand operation	----
Recommended fluid	DOT 4	----
Brake discs		
Diameter × thickness	298 × 5 mm	----
Min. thickness	----	4.5 mm
Max. deflection	----	0.1 mm
Brake pad lining thickness	5.5 mm	0.5 mm
		
Master cylinder inside diameter	14 mm	----
Caliper cylinder inside diameter	30.2 mm and 27 mm	----
Rear brake		
Brake type	Single-disc brake	----
Operation	Right-foot operation	----
Brake pedal position (from the top of the brake pedal to the bottom of the rider footrest bracket)	35 ~ 40 mm	----
Recommended fluid	DOT 4	----
Brake discs		
Diameter × thickness	245 × 5 mm	----
Min. thickness	----	4.5 mm
Max. deflection	----	0.1 mm
Brake pad lining thickness	5 mm	0.5 mm
		
Master cylinder inside diameter	12.7 mm	----
Caliper cylinder inside diameter	38.2 mm	----

Item	Standard	Limit
Front suspension		
Suspension type	Telescopic fork	----
Front fork type	Coil spring/oil damper	----
Front fork travel	135 mm	----
Spring		
Free length	255 mm	----
Spacer length	85 mm	----
Installed length	242.4 mm	----
Spring rate (K1)	7.35 N/mm (0.75 kgf/mm)	
Spring stroke (K1)	0 ~ 135 mm	----
Optional spring available	No	----
Fork oil		
Recommended oil	Suspension oil “01” or equivalent	----
Quantity (each front fork leg)	477 cm^3	----
Level (from the top of the inner tube, with the inner tube fully compressed, and without the fork spring)	78 mm	----
Damper adjusting rod locknut distance	11 mm	----
Spring preload adjusting positions		
Minimum	8	----
Standard	6	----
Maximum	1	----
Rebound damping adjusting positions		
Minimum*	13	----
Standard*	5	----
Maximum*	1	----
Compression damping adjusting positions		
Minimum*	11	----
Standard*	5	----
Maximum*	1	----
* from the fully turned-in position		

Item	Standard	Limit
Steering		
Steering bearing type	Angular ball bearings	----
Rear suspension		
Suspension type	Swingarm (link suspension)	----
Rear shock absorber assembly type	Coil spring/gas-oil damper	----
Rear shock absorber assembly travel	65 mm	----
Spring		
Free length	176 mm	----
Installed length	162.5 mm	----
Spring rate (K1)	7.84 N/mm (0.8 kgf/mm)	----
Spring stroke (K1)	0 ~ 65 mm	----
Optional spring available	No	----
Standard spring preload gas/air pressure	1,200 kPa (12 kgf/cm^2)	----
Spring preload adjusting positions		
Minimum	1	----
Standard	4	----
Maximum	9	----
Rebound damping adjusting positions		
Minimum*	12	----
Standard*	6	----
Maximum*	1	----
Compression damping adjusting positions		
Minimum*	12	----
Standard*	8	----
Maximum*	1	----
* from the fully turned-in position		
Swingarm		
Free play (at the end of the swingarm)		
Radial	----	1 mm
Axial	----	1 mm
Drive chain		
Model (manufacturer)	50ZVM (DAIDO)	----
Link quantity	114	----
Drive chain slack	40 ~ 50 mm	----
Maximum ten-link section	150.1 mm	----

ELECTRICAL SPECIFICATIONS

Item	Standard	Limit
System voltage	12 V	----
Ignition system		
Ignition system type	Transistorized coil ignition	----
Ignition timing	5° BTDC at 1,100 r/min	----
Advanced timing	55° BTDC at 5,000 r/min	----
Advancer type	Throttle position sensor and electrical	----
Pickup coil resistance/color	248 ~ 372 Ω / Gy–B	----
Transistorized coil ignition unit model (manufacturer)	TNDF41 (DENSO)	----
Ignition coils		
Model (manufacturer)	JO313 (DENSO)	----
Minimum ignition spark gap	6 mm	----
Primary coil resistance	1.87 ~ 2.53 Ω	----
Secondary coil resistance	12 ~ 18 kΩ	----
Spark plug caps		
Material	Resin	----
Resistance	10 kΩ	----
Throttle position sensor standard resistance	4 ~ 6 kΩ	----
Charging system		
System type	AC magneto	----
Model (manufacturer)	F4T361 (MITSUBISHI)	----
Nominal output	14 V / 26 A at 5,000 r/min	----
Stator coil resistance	0.45 ~ 0.55 Ω at 20°C	----
Voltage regulator		
Regulator type	Semiconductor, field control	----
Model	SH650A-12	----
No-load regulated voltage	14.1 ~ 14.9 V	----
Rectifier		
Model	SH650A-12	----
Rectifier capacity	18 A	----
Withstand voltage	200 V	----
Battery		
Battery type	GT12B-4	----
Battery voltage/capacity	12V / 10AH	----
Headlight type	Halogen bulb	
Indicator light type × quantity	LED × 5	
Bulbs (voltage/wattage × quantity)		
Headlight	12 V 60 W / 55 W × 2	----
Auxiliary light	12 V 5 W × 2	----
Tail/brake light	12 V 5 W / 21 W × 2	----
Turn signal light	12 V 21 W × 4	----
Meter light	12 V 1.4 W × 4	----

Item	Standard	Limit
Electric starting system		
System type	Constant mesh	----
Starter motor		
Model (manufacturer)	SM-13 (MITSUBA)	----
Power output	0.8 kW	----
Brushes		
Overall length	10 mm	5 mm
Spring force	7.03 ~ 10.63 N (717 ~ 1,084 gf)	----
Commutator resistance	0.025 ~ 0.035 Ω	----
Commutator diameter	28 mm	27 mm
Mica undercut	0.7 mm	----
Starter relay		
Model (manufacturer)	MS5F-631 (JIDECO)	----
Amperage	100 A	----
Coil resistance	4.18 ~ 4.62 Ω	----
Horn		
Horn type	Plain	----
Model (manufacturer) × quantity	YF-12 (NIKKO) × 1	----
Max. amperage	3 A	----
Turn signal relay		
Relay type	Full-transistor	----
Model (manufacturer)	FE246BH (DENSO)	----
Self-cancelling device built-in	No	----
Turn signal blinking frequency	60 ~ 120 cycles/min.	----
Wattage	21 W × 2	----
Oil level switch model (manufacturer)	3GM (DENSO)	----
Fuel sender		
Model (manufacturer)	3GM (DENSO)	----
Resistance	899.7 ~ 900.3 kΩ at 25 ˚C	----
Sidestand relay		
Model	3EN-00	----
Coil resistance	225 Ω	----
Fuel pump maximum amperage	1.2 A	----
Fuel pump relay model (manufacturer)	3EN-00 (OMRON)	----
Radiator fan model (manufacturer)	4XV (TOYO RADIATOR)	----
Thermo switch model (manufacturer)	3LN (NIPPON THERMOSTAT)	----

Item	Standard	Limit
Temperature sender		
Model (manufacturer)	2YK (NIPPON SEIKI)	----
Resistance	47.5 ~ 56.8 Ω at 80 ˚C 16.5 ~ 20.5 Ω at 115 ˚C	----
Fuses (amperage × quantity)		
Main fuse	30 A × 1	----
Headlight fuse	20 A × 1	----
Signaling system fuse	20 A × 1	----
Ignition fuse	15 A × 1	----
Radiator fan fuse	7.5 A × 1	----
Backup fuse (odometer)	7.5 A × 1	----

EB201000
CONVERSION TABLE

All specification data in this manual are listed in SI and METRIC UNITS.
Use this table to convert METRIC unit data to IMPERIAL unit data.

Ex.

METRIC		MULTIPLIER		IMPERIAL
** mm	×	0.03937	=	** in
2 mm	×	0.03937	=	0.08 in

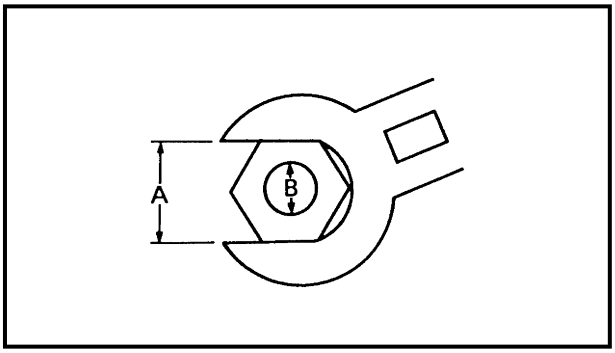
CONVERSION TABLE

METRIC TO IMPERIAL			
	Metric unit	Multiplier	Imperial unit
Tightening torque	m·kg m·kg cm·kg cm·kg	7.233 86.794 0.0723 0.8679	ft·lb in·lb ft·lb in·lb
Weight	kg g	2.205 0.03527	lb oz
Speed	km/hr	0.6214	mph
Distance	km m m cm mm	0.6214 3.281 1.094 0.3937 0.03937	mi ft yd in in
Volume/ Capacity	cc (cm^3) cc (cm^3) lt (liter) lt (liter)	0.03527 0.06102 0.8799 0.2199	oz (IMP liq.) cu·in qt (IMP liq.) gal (IMP liq.)
Misc.	kg/mm kg/cm^2 Centigrade (°C)	55.997 14.2234 9/5+32	lb/in psi (lb/in^2) Fahrenheit (°F)

EB202001
TIGHTENING TORQUES

GENERAL TIGHTENING TORQUES

This chart specifies tightening torques for standard fasteners with a standard ISO thread pitch. Tightening torque specifications for special components or assemblies are provided for each chapter of this manual. To avoid warpage, tighten multi-fastener assemblies in a crisscross pattern and progressive stages until the specified tightening torque is reached. Unless otherwise specified, tightening torque specifications require clean, dry threads. Components should be at room temperature.



A: Width across flats
B: Thread diameter

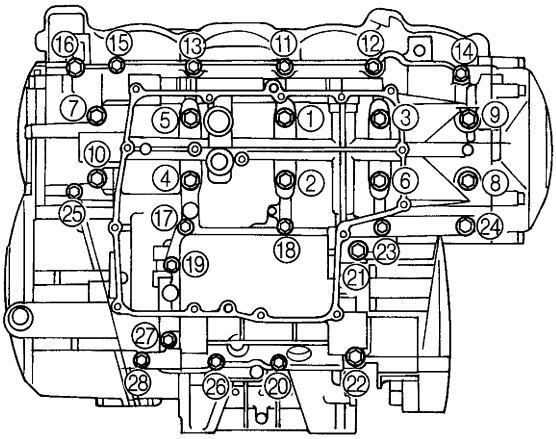
A (nut)	B (bolt)	General tightening torques		
		Nm	m•kg	ft•lb
10 mm	6 mm	6	0.6	4.3
12 mm	8 mm	15	1.5	11
14 mm	10 mm	30	3.0	22
17 mm	12 mm	55	5.5	40
19 mm	14 mm	85	8.5	61
22 mm	16 mm	130	13.0	94

ENGINE TIGHTENING TORQUES

Item	Fastener	Thread size	Q'ty	Tightening torque		Remarks
				Nm	m·kgf	
Spark plugs	–	M10	4	13	1.3	
Cylinder head	Nut	M10	8	50	5.0	E
Cylinder head	Cap nut	M10	2	50	5.0	E
Cylinder head	Bolt	M6	2	12	1.2	
Camshaft caps	Bolt	M6	28	10	1.0	E
Cylinder head cover	Bolt	M6	6	12	1.2	
Oil passage check bolt	Bolt	M8	1	20	2.0	
Cylinder head (exhaust pipe)	Stud bolt	M8	8	15	1.5	E
Connecting rod caps	Nut	M8	8	36	3.6	M
Generator rotor	Bolt	M10	1	95	9.5	E
Crankshaft sprocket	Bolt	M10	1	60	6.0	E
Cap bolt (timing chain tensioner)	Bolt	M6	1	10	1.0	
Camshaft sprocket	Bolt	M7	4	24	2.4	
Water pump inlet pipe	Bolt	M6	1	10	1.0	LT
Water pump outlet pipe	Bolt	M6	1	10	1.0	LT
Oil/water pump assembly driven sprocket	Bolt	M6	1	15	1.5	LT
Oil pump	Bolt	M6	1	10	1.0	
Oil cooler	Bolt	M20	1	35	3.5	E
Engine oil drain bolt	–	M14	1	43	4.3	
Oil strainer housing	Bolt	M6	2	10	1.0	LT
Oil/water pump assembly driven sprocket cover	Bolt	M6	1	10	1.0	LT
Oil pipe	Bolt	M6	1	10	1.0	LT
Oil filter bolt	Bolt	M20	1	70	7.0	
Oil filter cartridge	–	M20	1	17	1.7	E
Exhaust pipes	Nut	M8	8	20	2.0	
Muffler clamp	Bolt	M8	3	20	2.0	
Exhaust pipe emission check bolts	Bolt	M6	4	10	1.0	
EXUP valve pulley cover	Bolt	M6	3	10	1.0	LT
EXUP cable holder	Bolt	M8	2	10	1.0	
Exhaust pipe bracket	Bolt	M8	1	20	2.0	
Crankcase (cylinder head)	Stud bolt	M10	10	10	1.0	E
Crankcase	Bolt	M9	10	32	3.2	E
Crankcase	Bolt	M6	2	14	1.4	E
Crankcase	Bolt	M6	18	12	1.2	E
Crankcase	Bolt	M8	4	24	2.4	E
Generator rotor cover	Bolt	M6	9	12	1.2	
Drive sprocket cover	Bolt	M6	5	10	1.0	

Item	Fastener	Thread size	Q'ty	Tightening torque		Remarks
				Nm	m·kgf	
Clutch cover	Bolt	M6	8	12	1.2	
Pickup coil rotor cover	Bolt	M6	8	12	1.2	
Shift shaft cover	Bolt	M6	5	12	1.2	
Oil baffle plate	Bolt	M6	5	10	1.0	LT
Timing mark accessing screw	–	M8	1	15	1.5	
Starter clutch idle gear shaft	Bolt	M6	1	10	1.0	
Starter clutch	Bolt	M6	3	12	1.2	LT
Clutch boss	Nut	M20	1	70	7.0	Use a lock washer.
Clutch springs	Bolt	M6	6	8	0.8	
Drive sprocket	Nut	M22	1	85	8.5	Use a lock washer.
Main axle bearing housing	Screw	M6	3	12	1.2	LT
Shift drum retainer	Bolt	M6	2	10	1.0	LT
Shift shaft spring stopper	Bolt	M8	1	22	2.2	LT
Shift rod locknut	Nut	M6	2	7	0.7	
Shift arm	Bolt	M6	1	10	1.0	
Stator coil	Bolt	M6	3	10	1.0	LT
Ignitor unit	Bolt	M6	1	10	1.0	
Neutral switch	–	M10	1	20	2.0	
Pickup coil	Bolt	M6	2	10	1.0	LT
Temperature sender	–	–	1	15	1.5	
Thermo switch	–	M16	1	23	2.3	

Crankcase tightening sequence:



CHASSIS TIGHTENING TORQUES

Item	Thread size	Tightening torque		Remarks
		Nm	m·kgf	
Upper bracket pinch bolts	M8	23	2.3	
Steering stem nut	M28	115	11.5	
Handlebar pinch bolts	M8	17	1.7	
Lower ring nut	M30	9	0.9	See NOTE.
Lower bracket pinch bolts	M8	23	2.3	
Brake fluid reservoir cap stopper	M4	12	1.2	
Front brake hose union bolts	M10	30	3.0	
Front brake master cylinder	M6	13	1.3	
Engine mounting				
Left front mounting bolts	M10	40	4.0	
Right front mounting bolt	M12	55	5.5	
Rear mounting bolts	M10	55	5.5	
Pinch bolts	M8	24	2.4	
Exhaust pipe bracket	M8	24	2.4	
Pivot shaft nut	M18	125	12.5	
Connecting arms	M10	40	4.0	
Relay arm and connecting arms	M10	40	4.0	
Relay arm	M10	40	4.0	
Rear shock absorber and relay arm	M10	40	4.0	
Rear shock absorber assembly	M10	40	4.0	
Fuel cock	M6	7	0.7	
Fuel sender and fuel tank	M6	7	0.7	
Coolant reservoir and radiator	M6	5	0.5	
Rider footrest bracket	M8	28	2.8	
Passenger footrest bracket	M8	28	2.8	
Rear master cylinder	M8	23	2.3	
Rear brake hose union bolts	M10	30	3.0	
Sidestand	M10	63	6.3	
Front wheel axle	M18	72	7.2	
Rear wheel axle nut	M24	150	15.0	
Front brake caliper and front fork	M10	40	4.0	
Rear brake caliper and bracket	M10	40	4.0	
Brake disc and wheel	M6	18	1.8	
Rear wheel sprocket and rear wheel drive hub	M10	69	6.9	
Brake caliper and bleed screw	M8	6	0.6	
Pinch bolt (front wheel axle)	M8	23	2.3	

NOTE:

1.First, tighten the ring nut to approximately 28 Nm (2.8 m • kg) with a torque wrench, then loosen the ring nut completely.
2.Retighten the ring nut to specification.

EB202000

LUBRICATION POINTS AND LUBRICANT TYPES

ENGINE LUBRICATION POINTS AND LUBRICANT TYPES

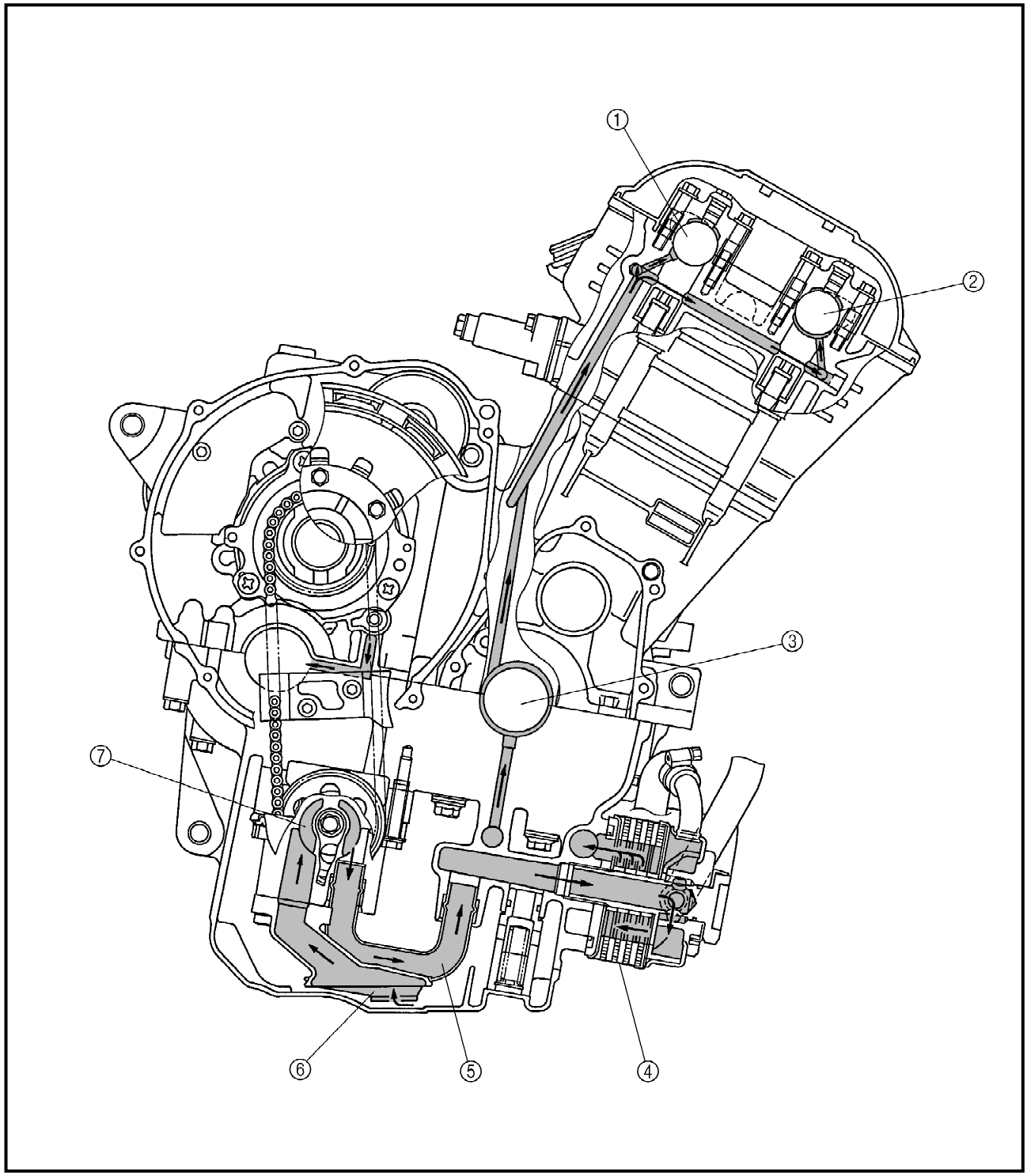
Lubrication point	Lubricant
Oil seal lips	LS
O-rings	LS
Bearings	E
Crankshaft pins	E
Piston surfaces	E
Piston pins	E
Connecting rod bolts and nuts	M
Crankshaft journals	E
Camshaft lobes	M
Camshaft journals	M
Valve stems (intake and exhaust)	M
Valve stem ends (intake and exhaust)	E
Water pump impeller shaft	E
Oil pump rotors (inner and outer)	E
Oil pump housing	E
Oil strainer	E
Starter clutch idle gear inner surface	E
Starter clutch assembly	E
Primary driven gear	E
Transmission gears (wheel and pinion)	M
Main axle and drive axle	M
Shift drum	E
Shift forks and shift fork guide bars	E
Shift shaft	E
Shift shaft boss	LS
Engine mounting bolts (rear)	LS
Cylinder head cover mating surface	Yamaha bond No.1215
Crankcase mating surface	Yamaha bond No.1215
Clutch cover (crankcase mating surface)	Yamaha bond No.1215
Generator rotor cover (crankcase mating surface)	Yamaha bond No.1215
Cylinder head cover	Yamaha bond No.1215

EB202010
CHASSIS LUBRICATION POINTS AND LUBRICANT TYPES

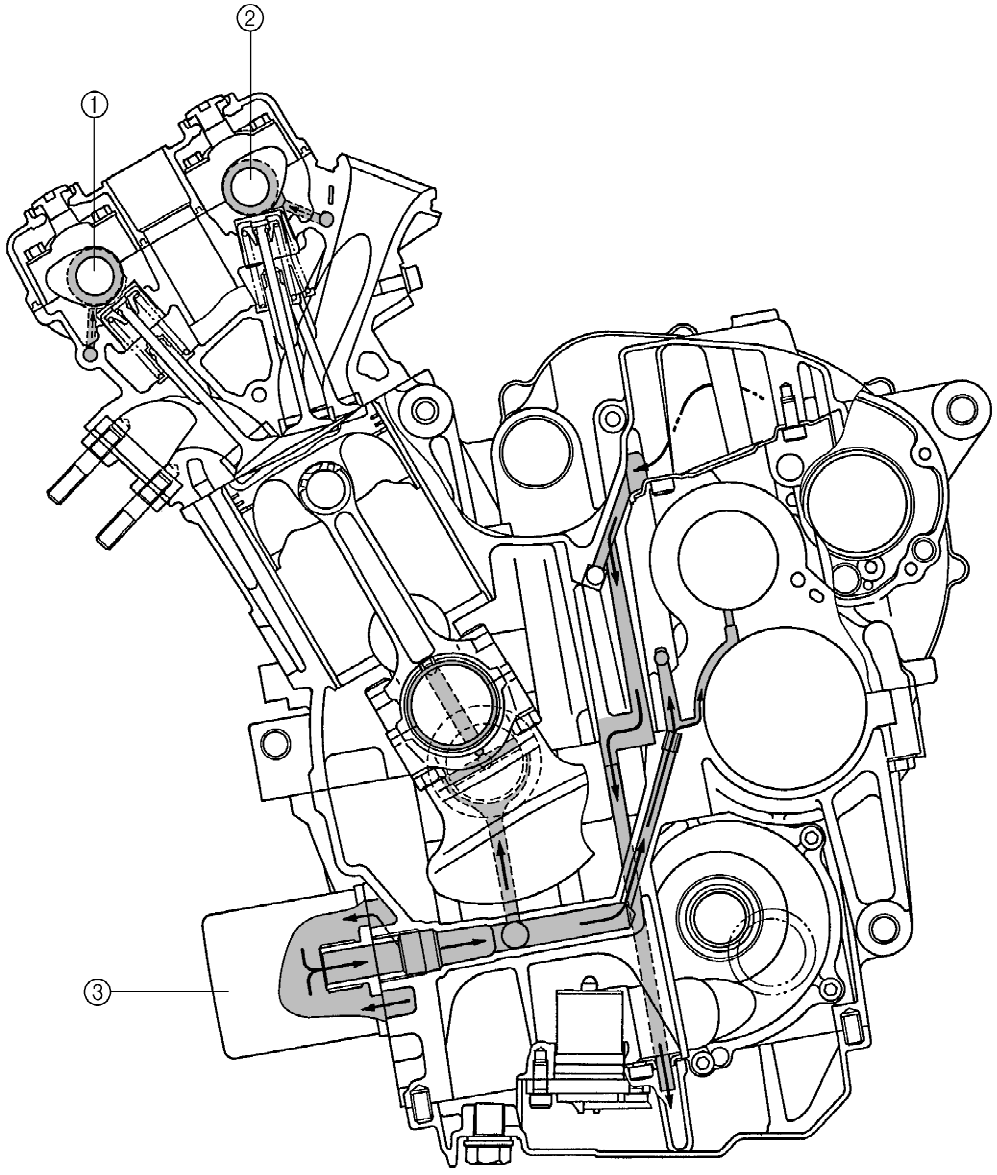
Lubrication point	Lubricant
Steering bearings and bearing races (upper and lower)	LS
Front wheel oil seal (right and left)	LS
Rear wheel oil seal	LS
Rear wheel drive hub oil seal	LS
Rear wheel drive hub mating surface	LS
Rear brake pedal	LS
Sidestand pivoting point and metal-to-metal moving parts	LS
Throttle grip inner surface	LS
Brake lever pivoting point and metal-to-metal moving parts	LS
Clutch lever pivoting point and metal-to-metal moving parts	LS
Rear shock absorber assembly oil seal	LS
Rear shock absorber assembly bearing	LS
Rear shock absorber assembly spacer	LS
Pivot shaft	LS
Connecting arm bearing (left and right)	LS
Spacer (relay arm and connecting arm)	LS
Oil seal (relay arm and connecting arm)	LS

EB203000
OIL FLOW DIAGRAMS

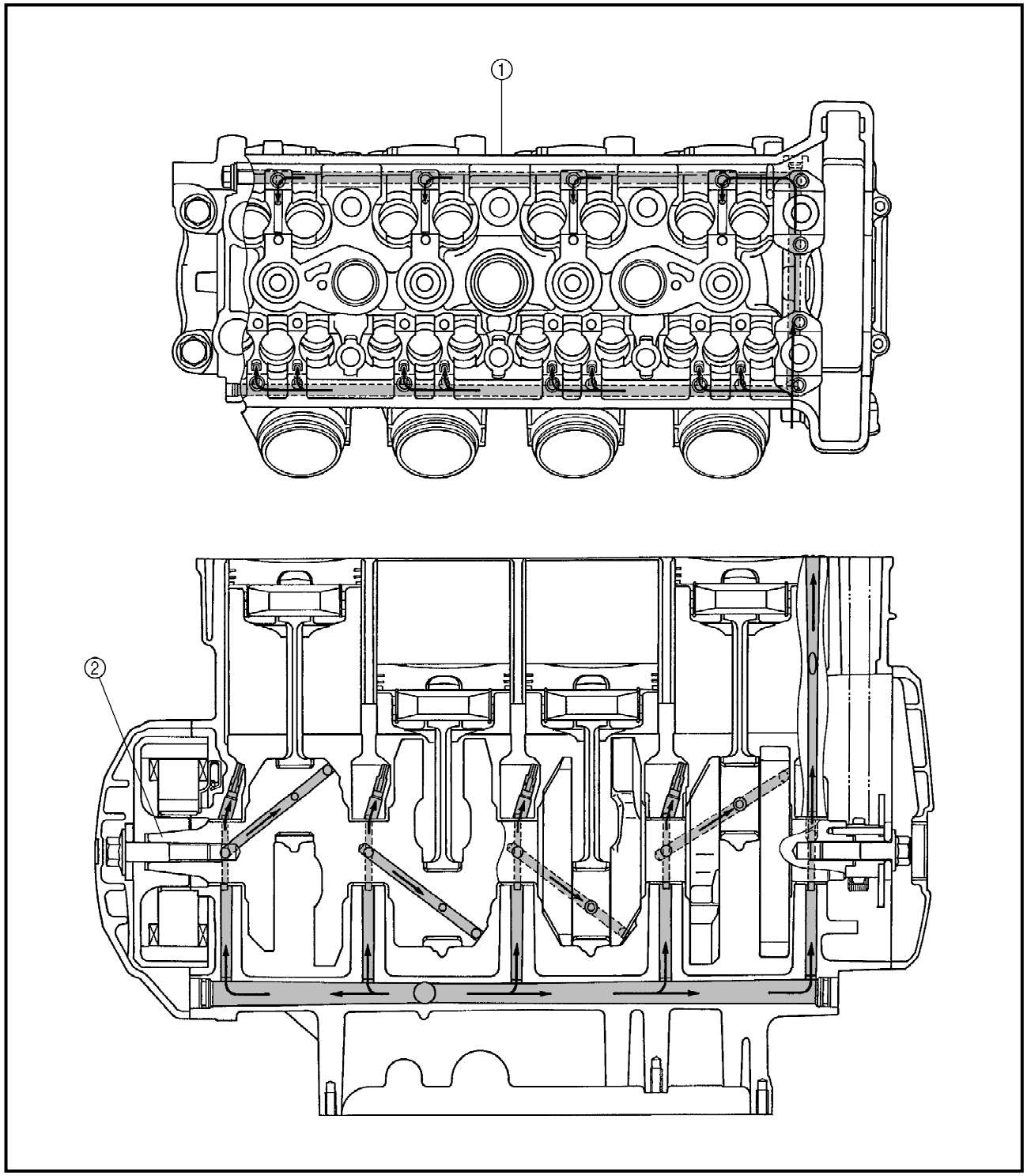
① Intake camshaft
② Exhaust camshaft
③ Crankshaft
④ Oil cooler
⑤ Oil pipe
⑥ Oil strainer
⑦ Oil pump



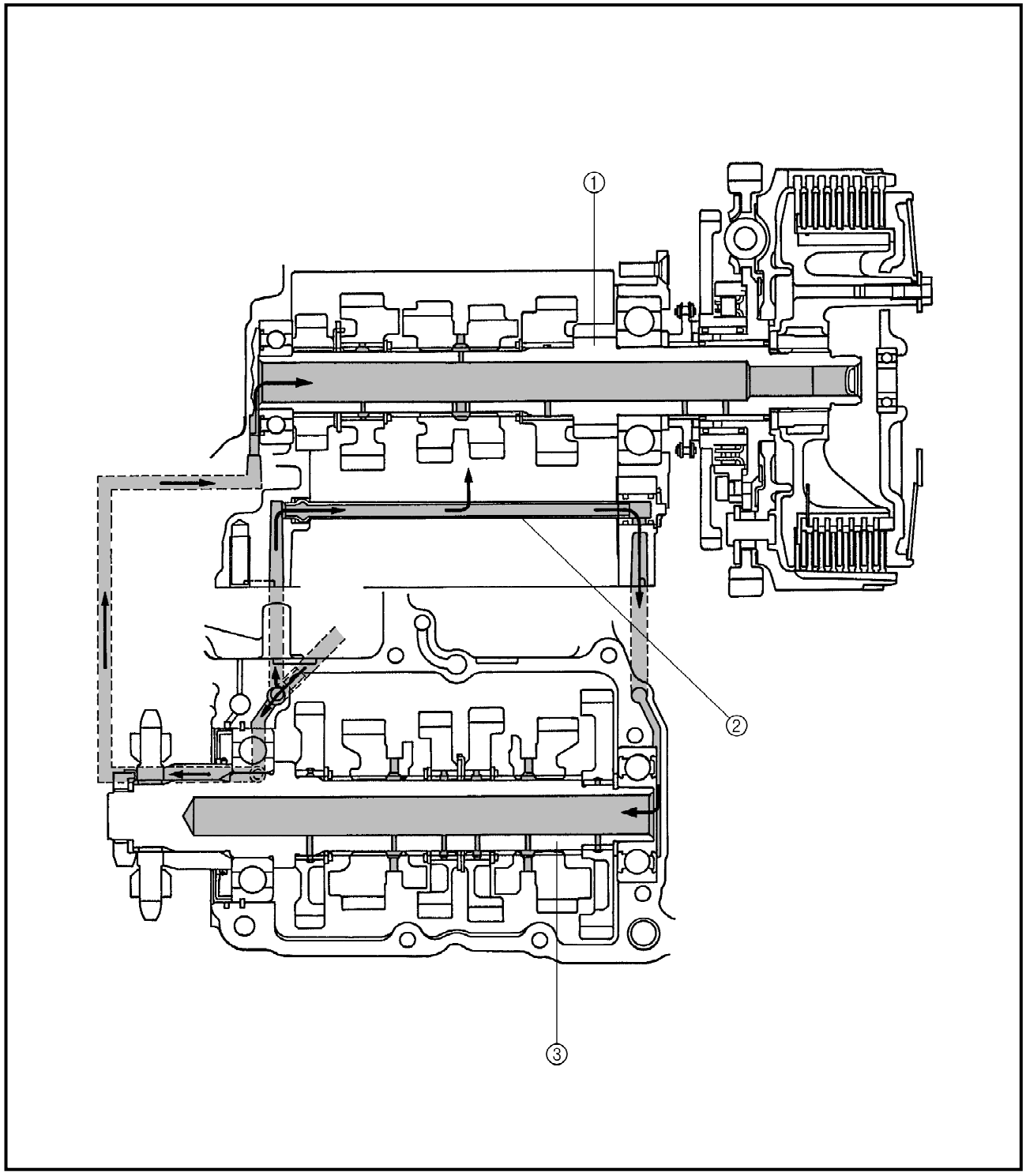
① Exhaust camshaft
② Intake camshaft
③ Oil filter



① Cylinder head
② Crankshaft

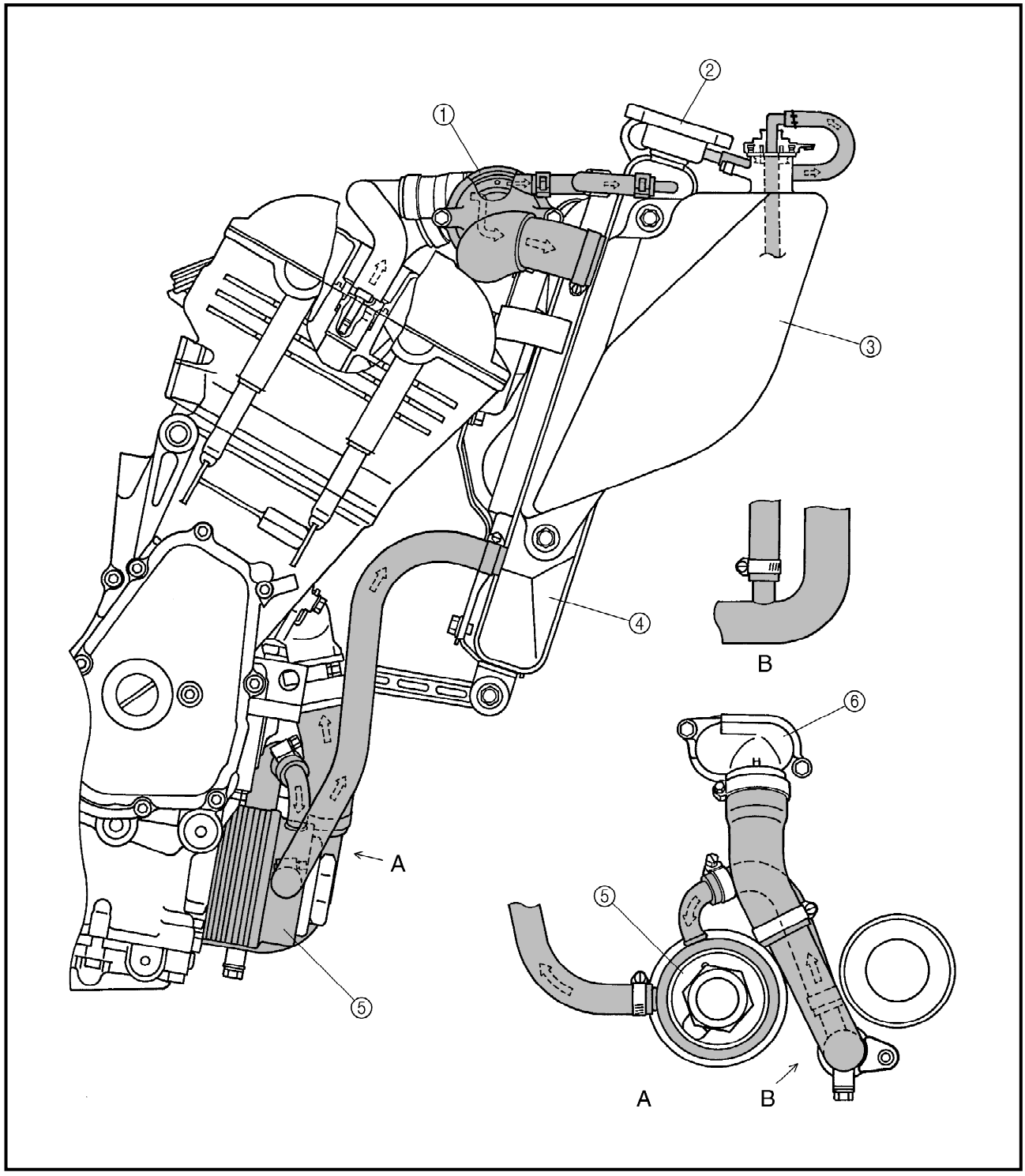


① Main axle
② Oil delivery pipe
③ Drive axle

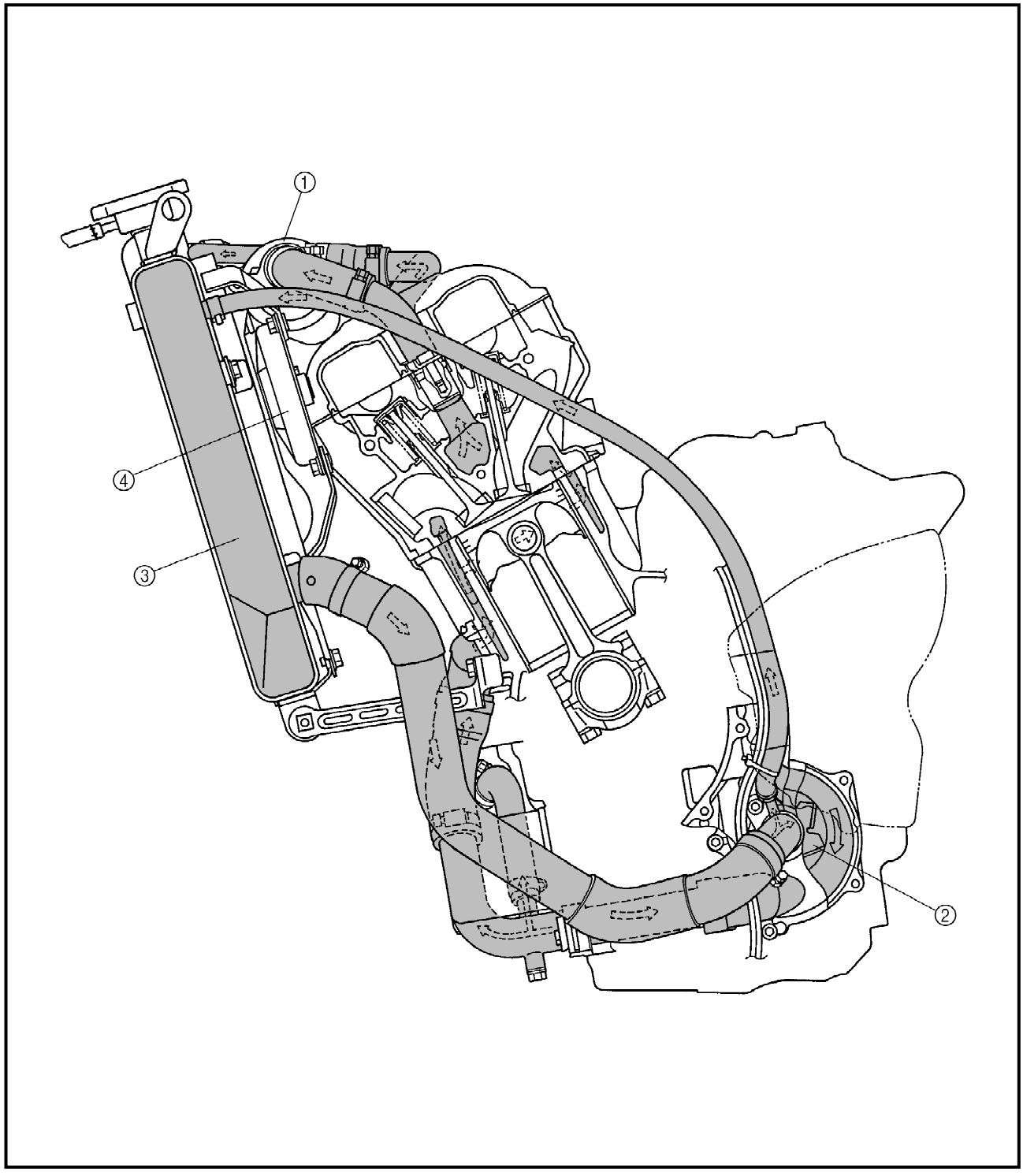


EB203000
COOLANT FLOW DIAGRAMS

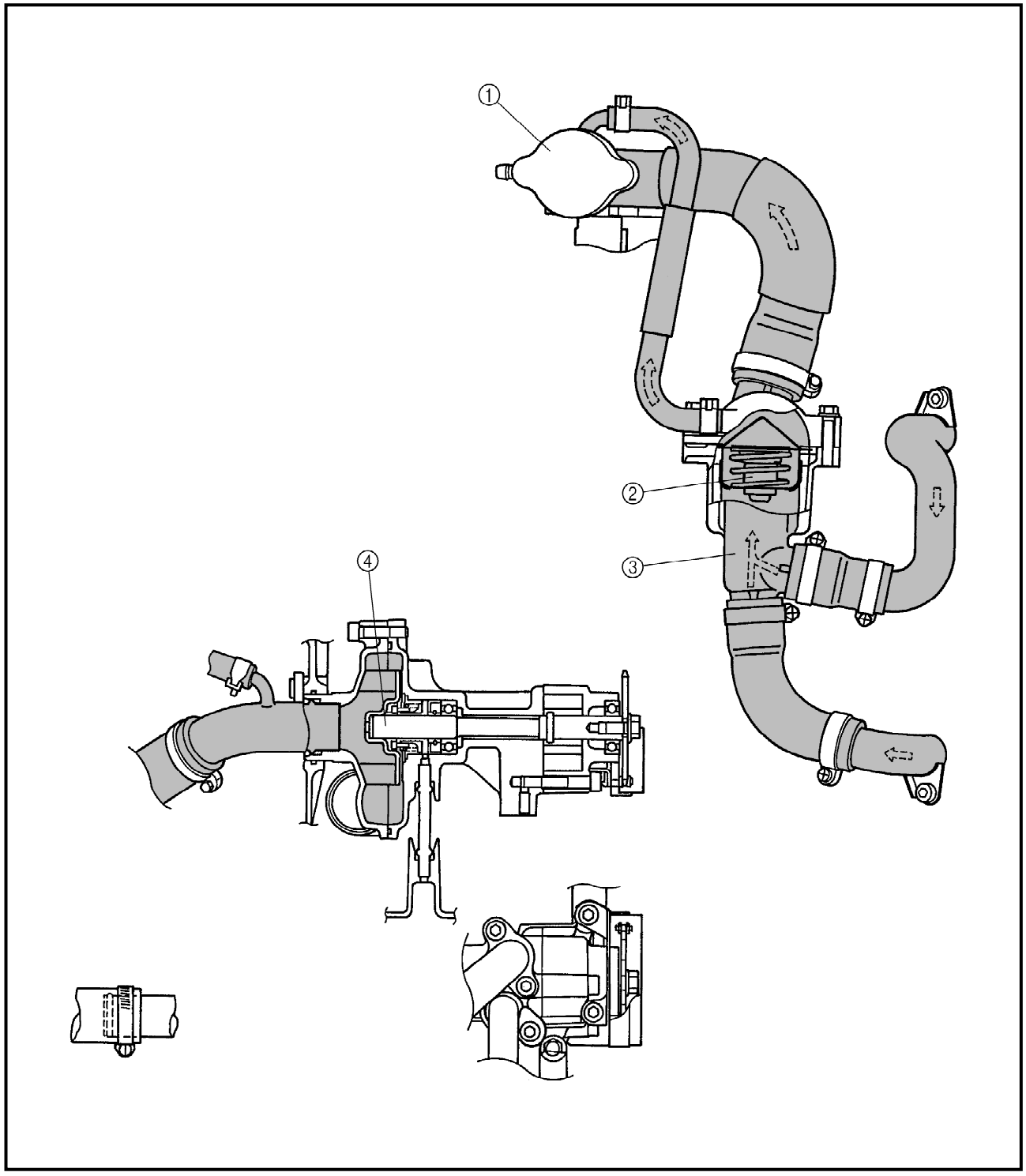
① Thermostat
② Radiator cap
③ Coolant reservoir
④ Radiator
⑤ Oil cooler
⑥ Water jacket joint



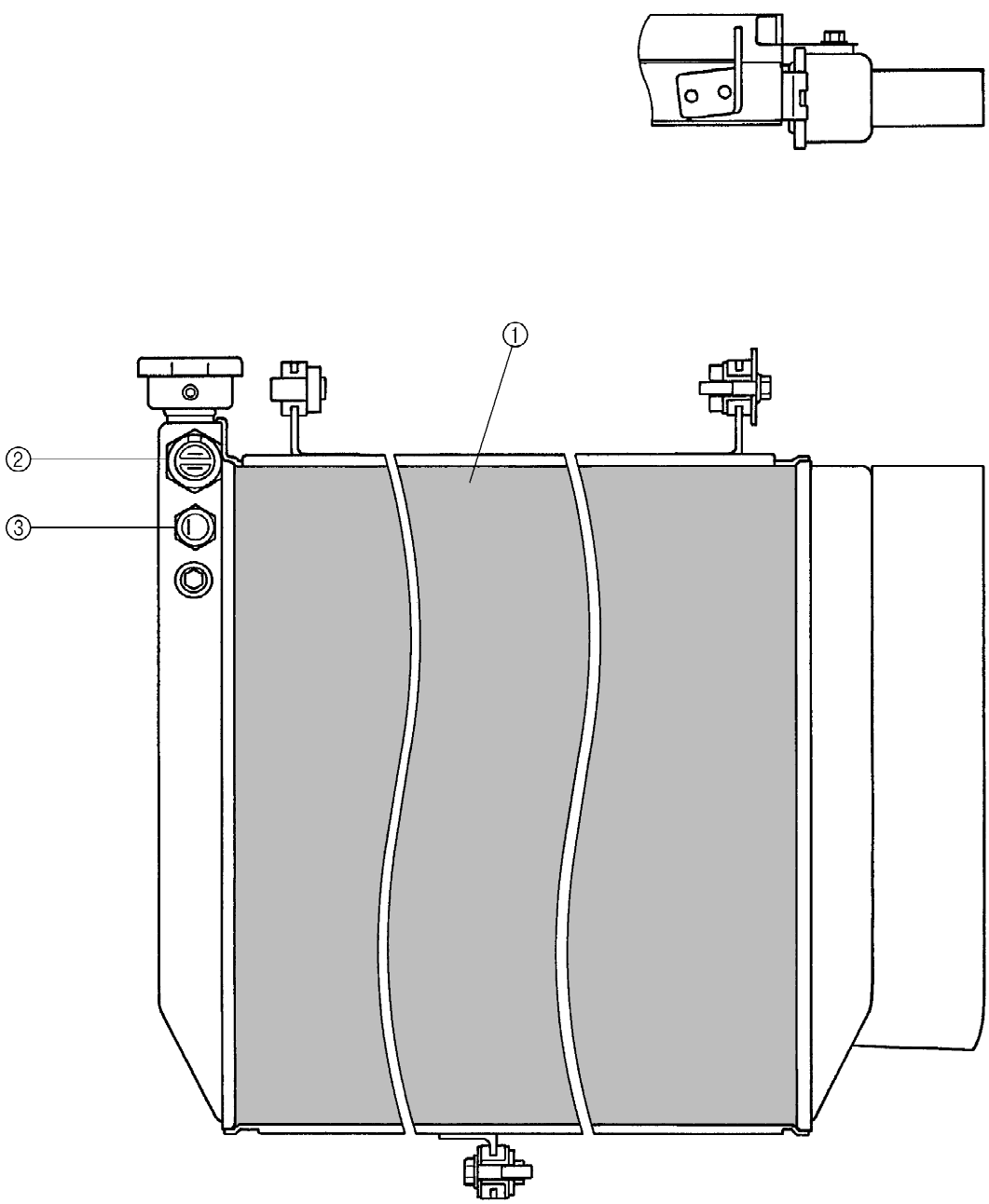
① Thermostat housing
② Water pump
③ Radiator
④ Radiator fan



① Radiator cap
② Thermostat
③ Thermostat housing
④ Water pump



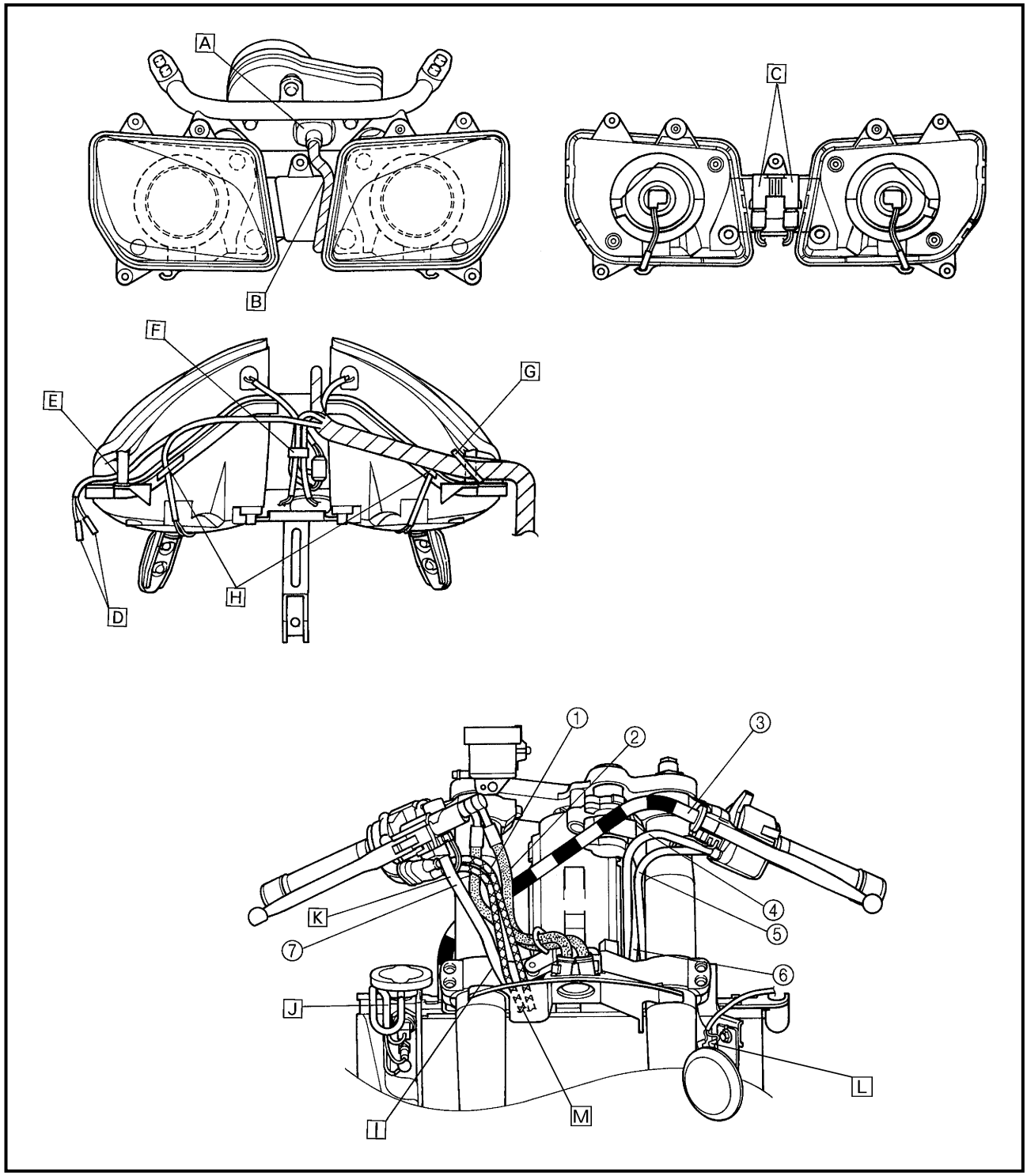
① Radiator
② Thermo switch
③ Temperature sender



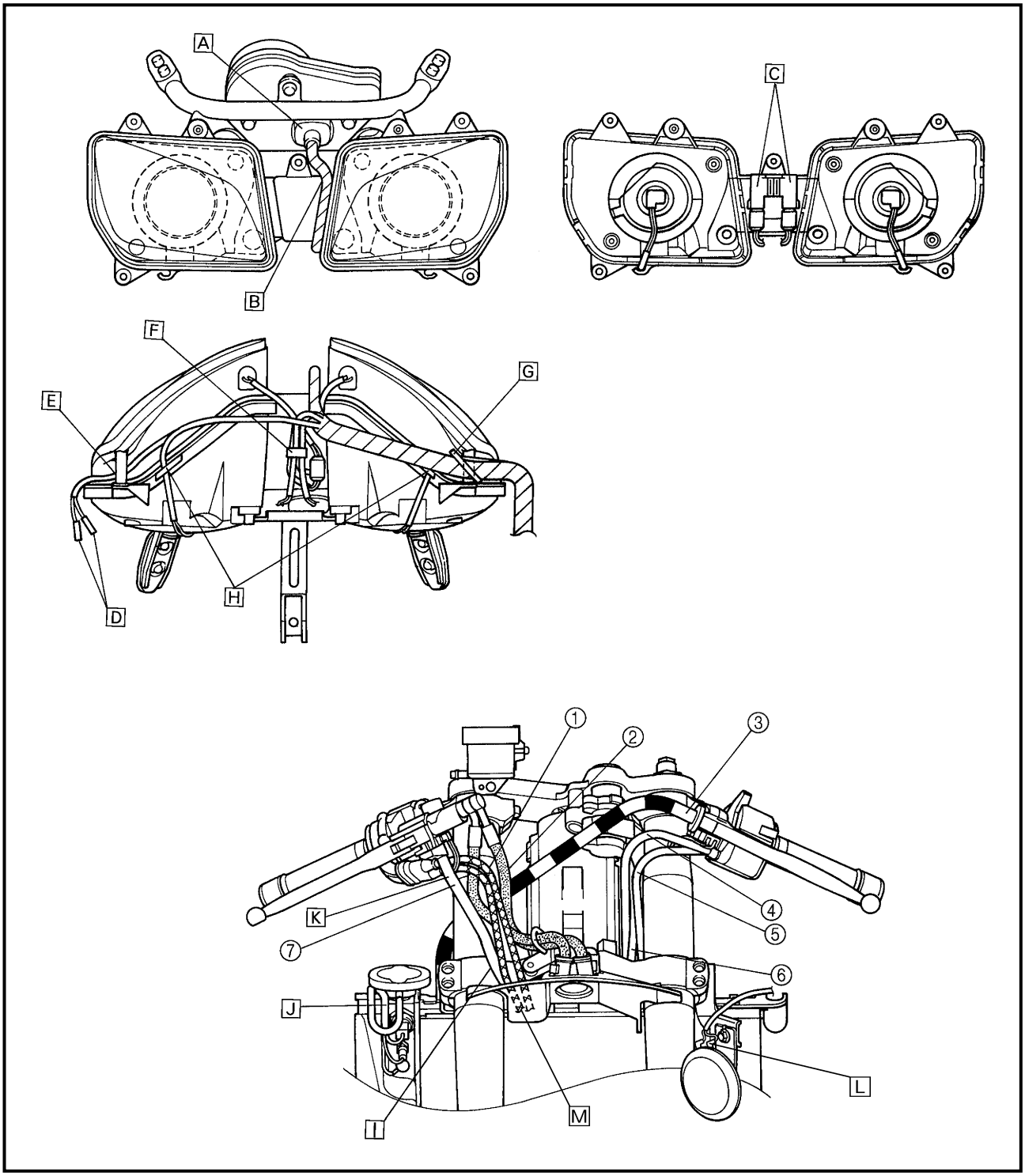
EB206000
CABLE ROUTING

① Throttle cables
② Front brake hose
③ Clutch cable
④ Starter cable
⑤ Left handlebar switch lead
⑥ Main switch lead
⑦ Right handlebar switch lead

A Properly insert the meter assembly coupler and rubber boot into the meter assembly.
B Route the meter assembly lead through the left side of the headlight housing.
C Install the headlight relays onto the headlight housing bridge.
D Connect to the right front turn signal connectors.
E Route the turn signal leads between the headlight housing and headlight housing boss.

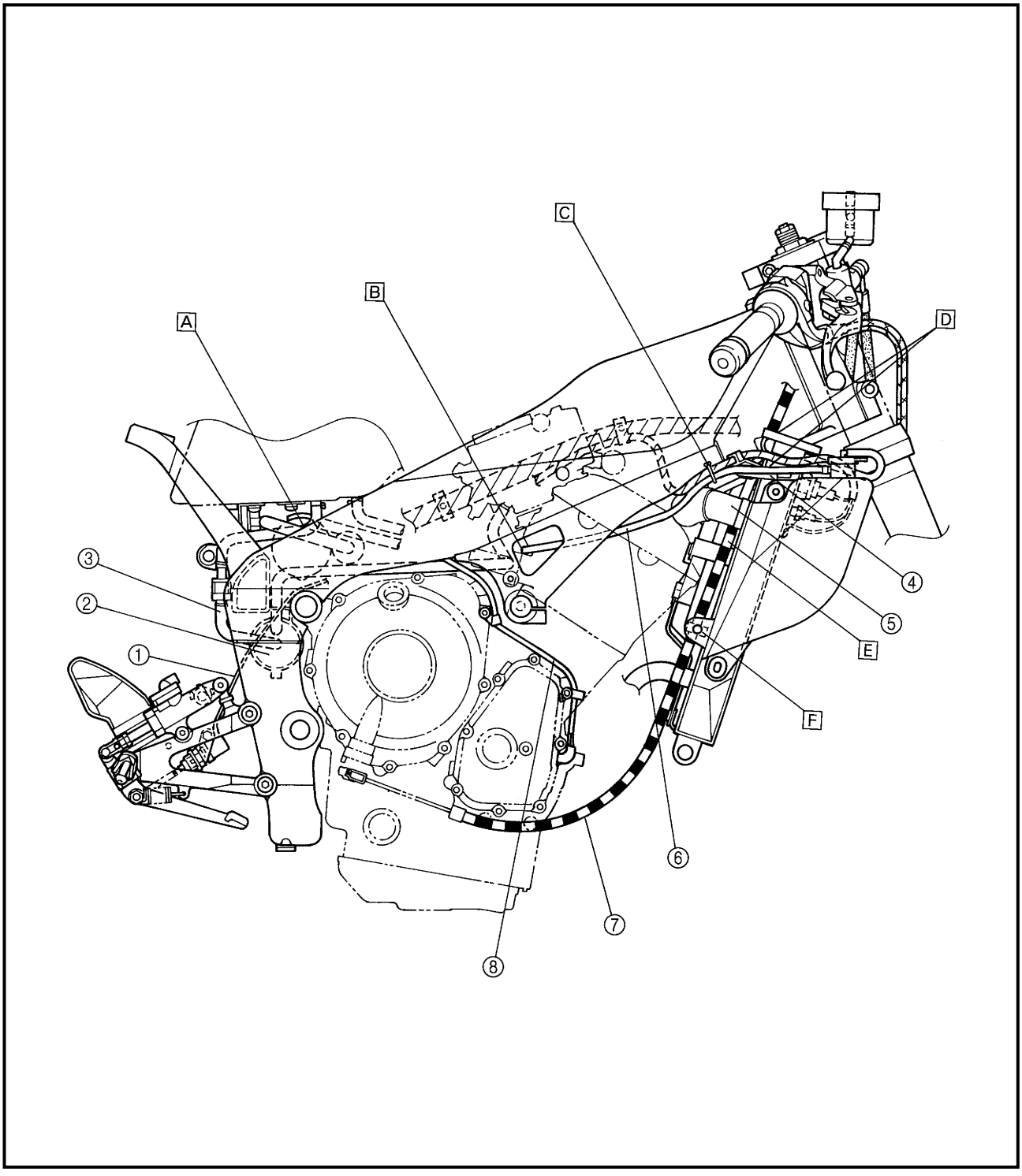


F Fasten the auxiliary light leads with a plastic locking tie.
G Fasten the wire harness to the headlight housing boss with a plastic locking tie.
H Route the headlight lead through the plastic guide.
I Route the right handlebar switch lead behind the throttle cables. Do not cross the throttle cables and the right handlebar switch lead.
J Route the thermo switch/temperature sender subwire harness to the outside of the radiator cap.
K Route the right handlebar switch lead in front of the throttle cables.
L Make sure that the horn leads face out.
M Route the throttle cables and right handlebar switch lead between the frame and plastic frame panel and then between the lower bracket and lower bracket panel. Make sure that the right handlebar switch lead is routed to the outside and the throttle cables are routed to the inside.



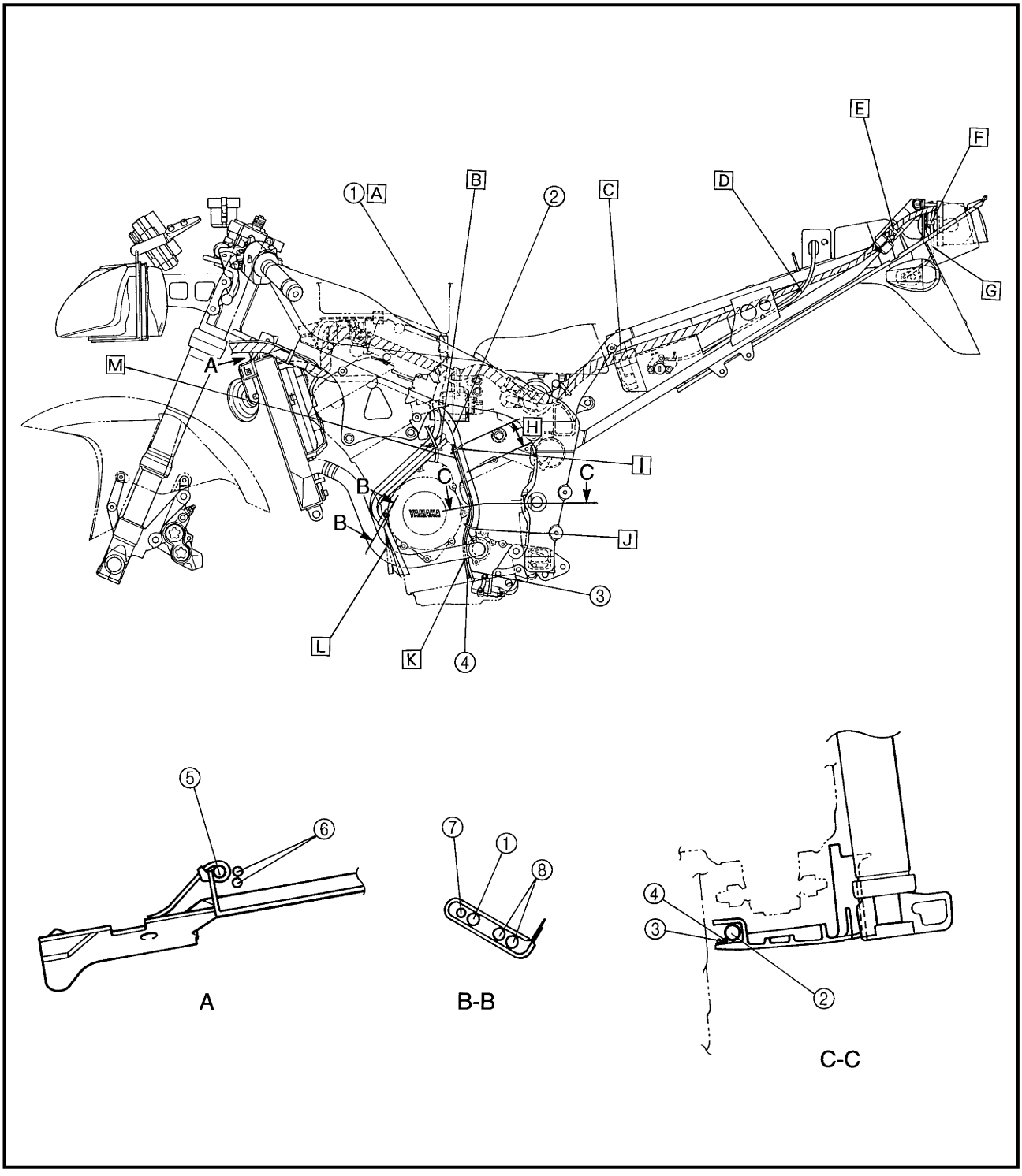
① Rear brake switch lead
② Charcoal canister (California only)
③ Rollover valve (California only)
④ Thermostat assembly breather hose
⑤ Radiator inlet hose
⑥ Coolant reservoir breather hose
⑦ Clutch cable
⑧ Pickup coil lead

[A] Route the rollover-valve-to-fuel-tank hose to the inside of the fuel hose (California only).
[B] Route the coolant reservoir breather hose over the timing chain tensioner.
[C] Insert the plastic clip through the hole in the plastic frame panel and then fasten the wire harness and coolant reservoir breather hose with it.
[D] Route the clutch cable between the radiator bracket and frame and in front of the thermostat assembly breather hose.
[E] Route the clutch cable to the inside of the radiator inlet hose.
[F] Insert the plastic clamp into the hole in the coolant reservoir's tab.

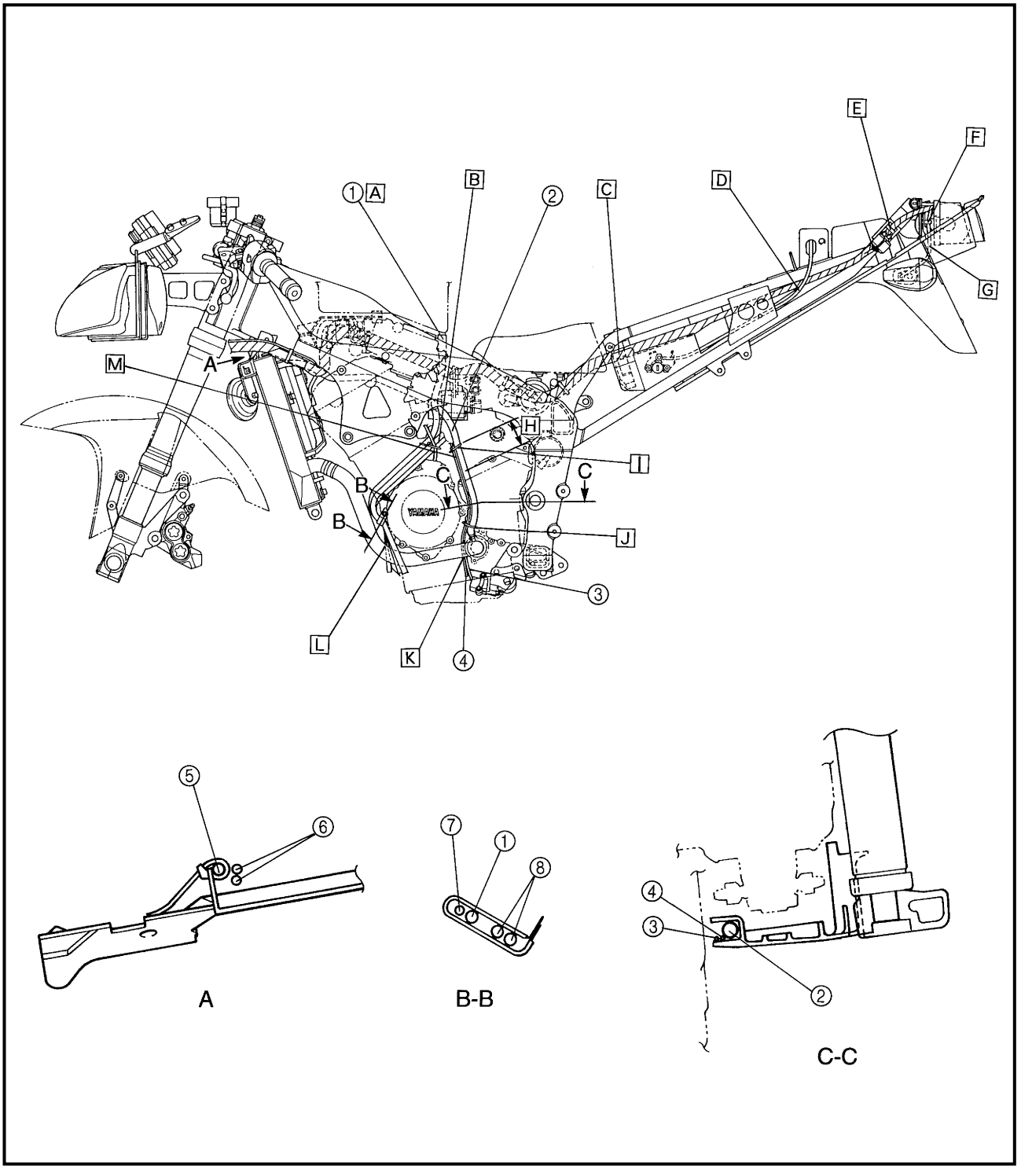


① Air filter case breather hose
② Water pump breather hose
③ Sidestand switch lead
④ Oil level switch lead
⑤ Right handlebar switch lead
⑥ Throttle cables
⑦ Coolant reservoir breather hose
⑧ Fuel tank overflow hose and fuel tank breather hose

Ⓐ Route the air filter case breather hose to the inside of the wire harness.
Ⓑ Route the stator coil lead over all of the hoses and leads and then fasten them with a plastic clip.
Ⓒ Align the wire harness with the indent in the upper rear fender.
Ⓓ Route the seat lock cable over the wire harness.
Ⓔ Fasten the wire harness with a plastic clamp.
Ⓕ Route the rear left turn signal lead through the plastic clamp.
Ⓖ Route the rear left turn signal lead through the hole in the upper rear fender.

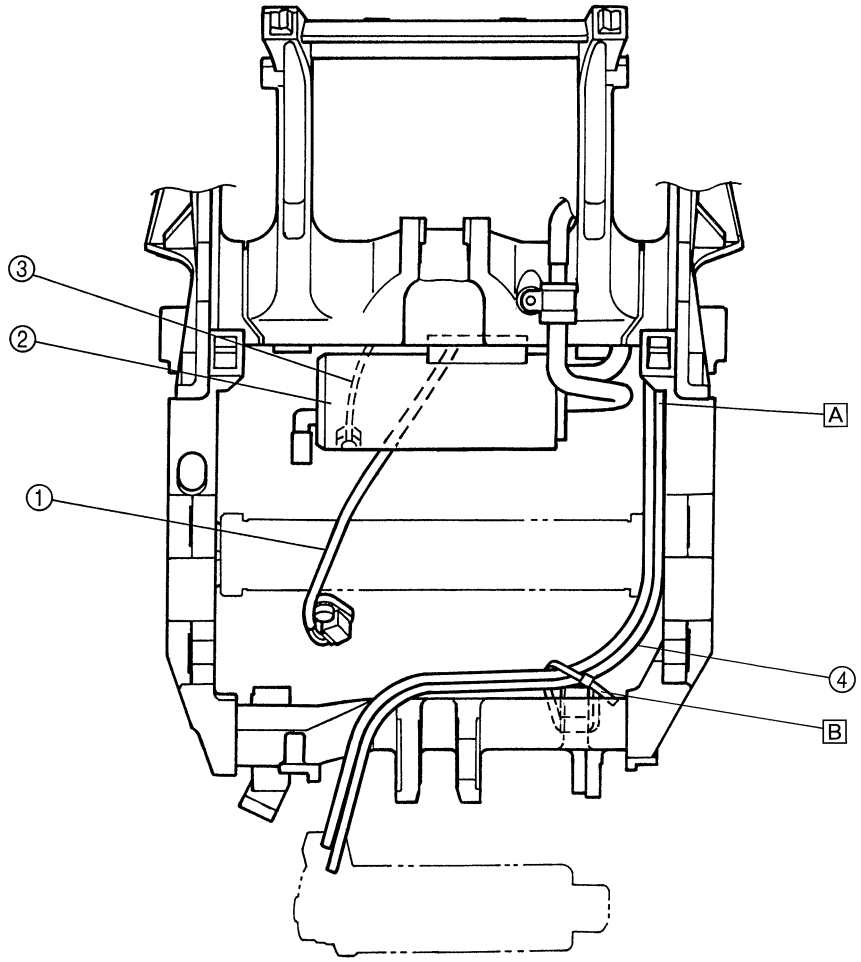


H 50 mm
I Fasten the sidestand switch lead, engine oil level switch lead, and water pump breather hose with a plastic clip.
J Do not crush the water pump breather hose and plastic clip.
K Route both of the leads (③ and ④) to the inside of the radiator outlet hose.
L Route the fuel tank overflow hose and fuel tank breather hose over the radiator outlet hose. Route the air filter case drain hose and coolant reservoir breather hose to the inside of the radiator outlet hose. Make sure that the ends of all of the hoses are below the radiator outlet hose and are not touching the bottom cowling.
M Route the sidestand switch lead and oil level switch lead to the inside of the drive sprocket cover.

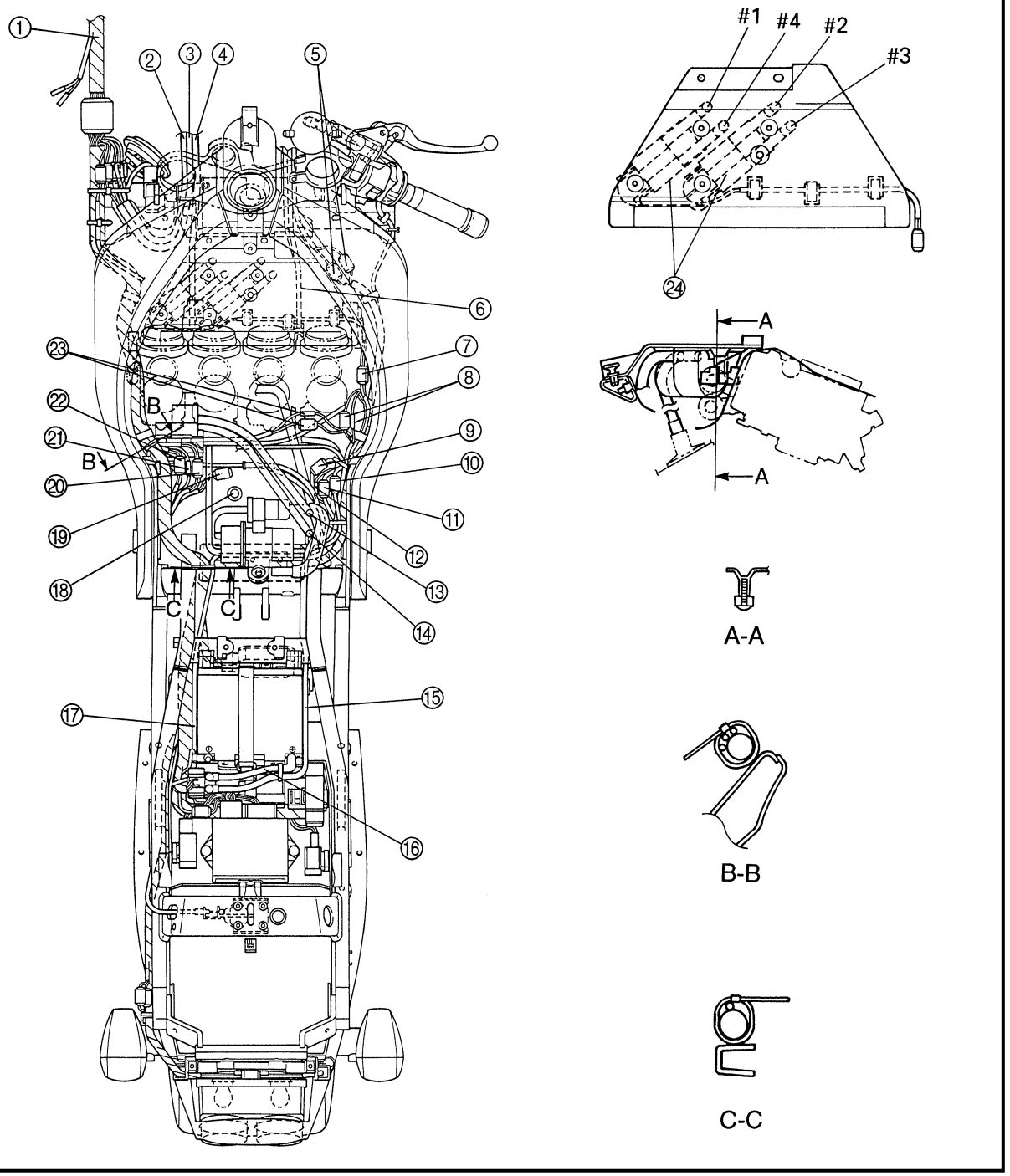


① Speed sensor lead
② Charcoal canister (California only)
③ Neutral switch lead
④ EXUP cables

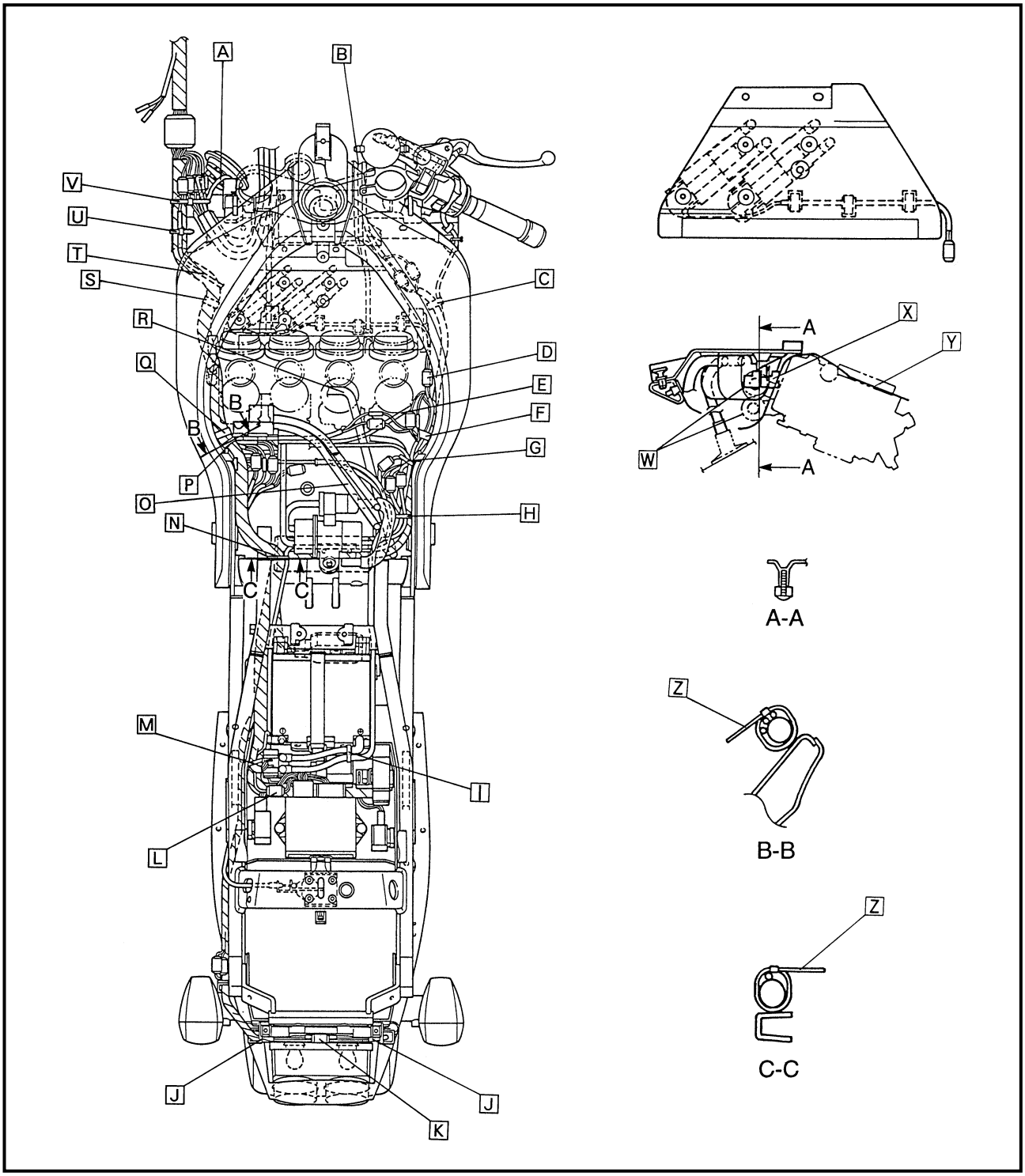
A Route the EXUP cables on the outside of the engine mount.
B Fasten the EXUP cables with a plastic locking tie.



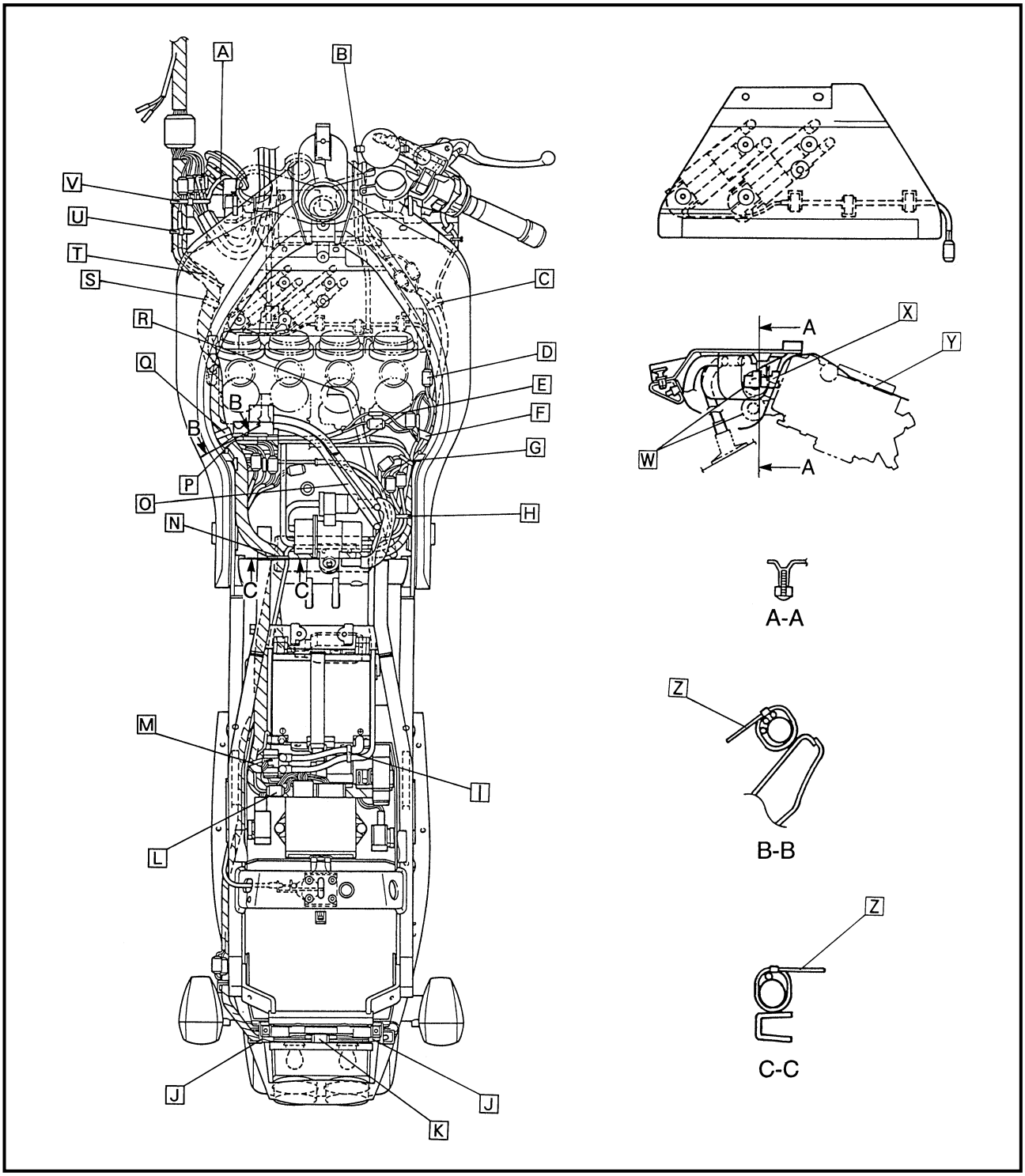
① Headlight sub-wire harness
② Left handlebar switch lead
③ Main switch lead
④ Starter cable
⑤ Right handlebar switch coupler
⑥ Throttle cables
⑦ Ignition coil coupler
⑧ Pickup coil coupler
⑨ Rear brake switch coupler
⑩ Fuel pump coupler
⑪ Speed sensor coupler
⑫ Neutral switch connector
⑬ Fuel tank overflow hose
⑭ Fuel tank breather hose (except for California)
⑮ Starter motor lead
⑯ Battery positive lead
⑰ Battery negative lead
⑱ Crankcase breather hose
⑲ Fuel sender coupler
⑳ Sidestand switch coupler
㉑ Engine oil level switch lead
㉒ Generator coupler
㉓ EXUP servomotor coupler
㉔ Ignition coils



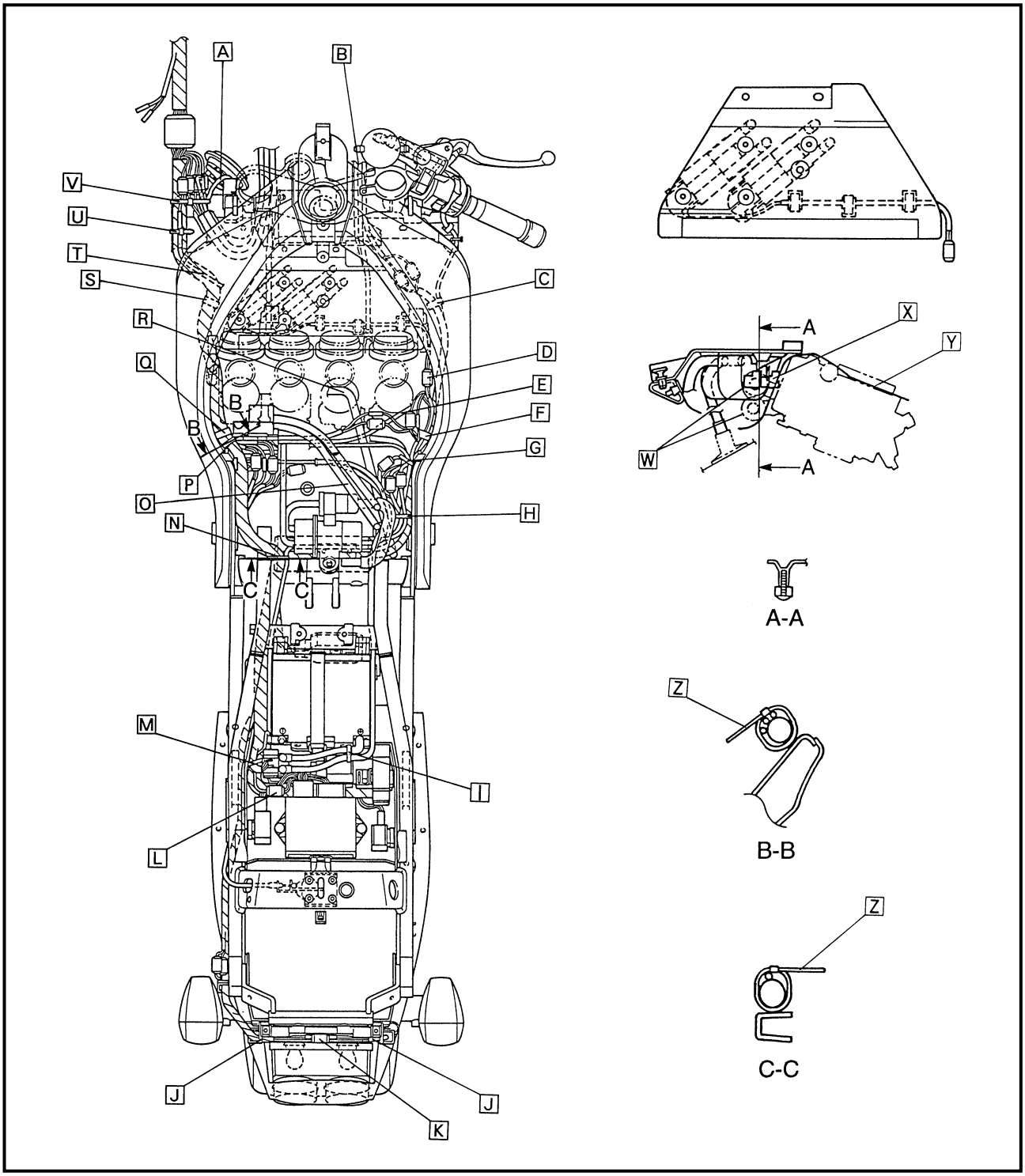
[A] Route the horn lead over the horn bracket and make sure that the lead has no slack.
[B] Do not cross the throttle cables and right handlebar switch lead.
[C] Fasten the wire harness with a plastic clamp.
[D] Route the ignition coil sub-wire harness under the throttle position sensor.
[E] Route the coolant reservoir breather hose over the battery negative lead and starter motor lead.
[F] Fasten the wire harness and ignition coil sub-wire harness with a plastic clamp.
[G] Fasten the EXUP servomotor lead, fuel pump lead, speed sensor lead, neutral switch lead, EXUP cables, and wire harness with a plastic locking tie.
[H] Fasten the fuel pump lead, speed sensor lead, neutral switch lead, battery negative lead, starter motor lead, EXUP cables, and wire harness with a plastic locking tie.
[I] Fasten the battery positive lead and starter motor lead with a plastic locking tie.



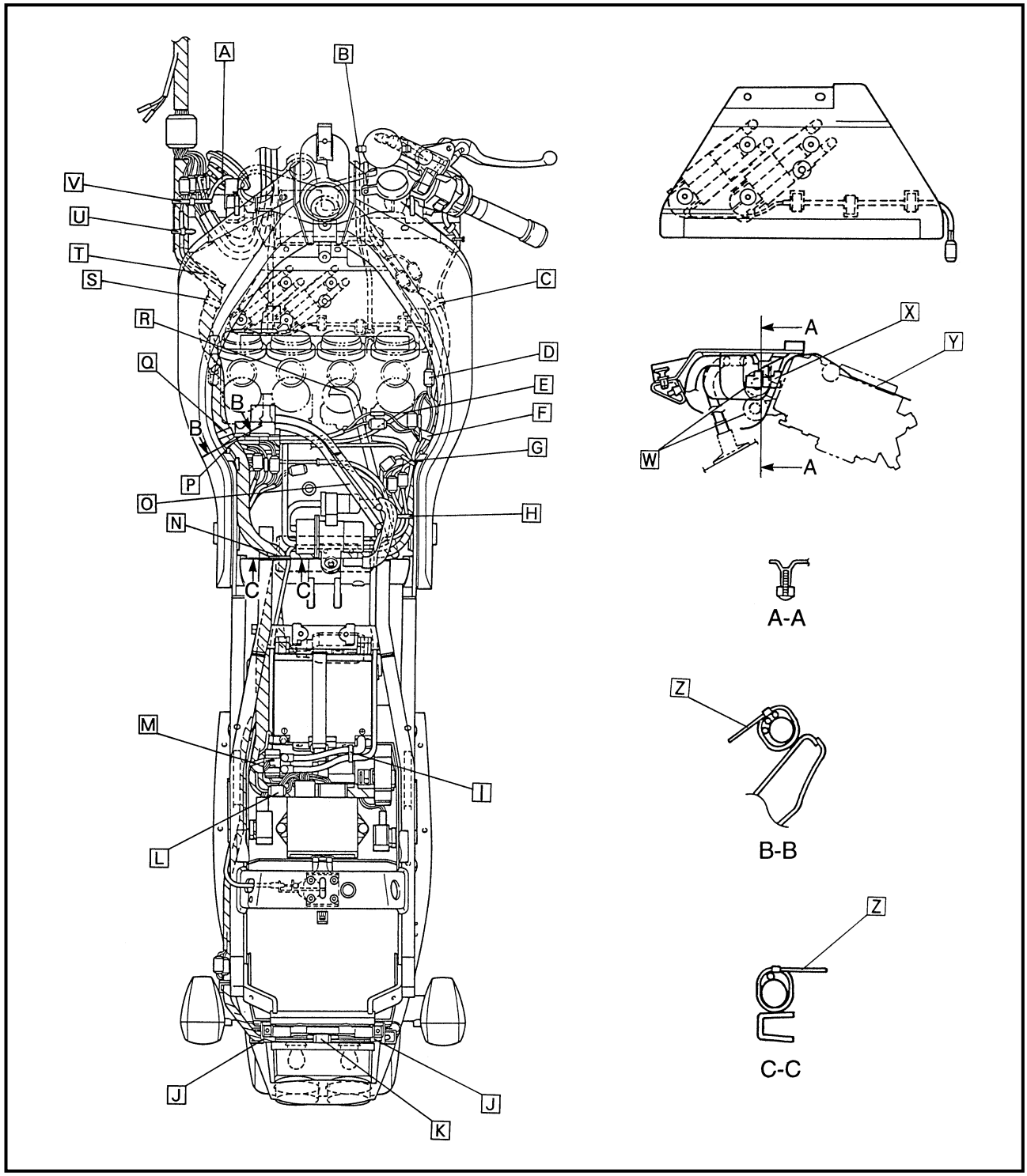
[J] Route the wire harness and turn signal leads under the rear cowling mounting post on the tail/brake light bracket.
[K] Insert the tail/brake light coupler and turn signal leads between the tail/brake light and tail/brake light bracket.
[L] Position the ground coupler over the oil level relay lead.
[M] Fasten the starter relay lead, ground lead, and wire harness with a plastic locking tie.
[N] Fasten the battery negative lead and wire harness with a plastic locking tie.
[O] Route the fuel tank overflow hose and fuel tank breather hose in front of the crankcase breather hose and under the fuel hose and EXUP servomotor.
[P] Fasten the sidestand switch lead, engine oil level switch lead, generator lead, and wire harness with a plastic locking tie.

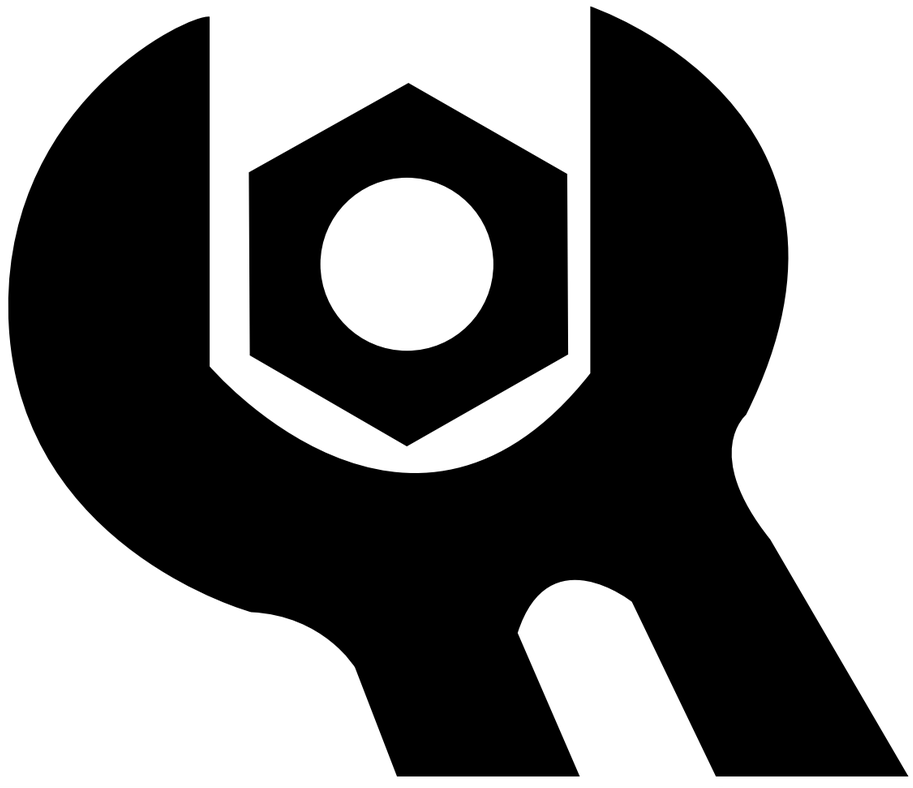


Q Fasten the wire harness with a plastic clamp and then insert the clamp into the frame.
R Route the charcoal canister hose under the EXUP servomotor lead, battery negative lead, starter motor lead, and EXUP cables (California only).
S Insert the plastic clamp into the hole in the frame.
T Route the radiator fan lead over the wire harness.
U Fasten the wire harness and radiator fan lead to the plastic frame panel with a plastic locking tie.
V The end of the plastic locking tie must face in.
W Route the vacuum chamber air vent hoses through the hole and slit in the rubber baffle.
X Route the ignition coil sub-wire harness in front of the foam damper on the ignition coil plate, then connect the connectors to the ignition coil terminals, and make sure that the lead side of the connectors face up.



[Y] Install the rubber baffle over the carburetor air funnels.
[Z] The end of the plastic locking tie must face in and down.





CHK

ADJ

3

CHAPTER 3.
PERIODIC CHECKS AND ADJUSTMENTS

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EB300000

PERIODIC CHECKS AND ADJUSTMENTS

INTRODUCTION

This chapter includes all information necessary to perform recommended checks and adjustments. If followed, these preventive maintenance procedures will ensure more reliable vehicle operation, a longer service life and reduce the need for costly overhaul work. This information applies to vehicles already in service as well as to new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

EB301000

PERIODIC MAINTENANCE AND LUBRICATION INTERVALS

No.		ITEM	CHECKS AND MAINTENANCE JOBS	INITIAL (1,000 km)	EVERY	
					6,000 km or 6 months (whichever comes first)	12,000 km or 12 months (whichever comes first)
1	*	Fuel line	• Check fuel hoses for cracks or damage. • Replace if necessary.		√	√
2	*	Fuel filter	• Check condition. • Replace if necessary.			√
3		Spark plugs	• Check condition. • Clean, regap or replace if necessary.	√	√	√
4	*	Valves	• Check valve clearance. • Adjust if necessary.	**Every 42,000 km or 42 months (whichever comes first)**		
5		Air filter element	• Clean or replace if necessary.		√	√
6		Clutch	• Check operation. • Adjust or replace cable.	√	√	√
7	*	Front brake	• Check operation, fluid level and vehicle for fluid leakage. (See NOTE on page 3-2.) • Correct accordingly. • Replace brake pads if necessary.	√	√	√
8	*	Rear brake	• Check operation, fluid level and vehicle for fluid leakage. (See NOTE on page 3-2.) • Correct accordingly. • Replace brake pads if necessary.	√	√	√
9	*	Wheels	• Check balance, runout and for damage. • Rebalance or replace if necessary.		√	√
10	*	Tires	• Check tread depth and for damage. • Replace if necessary. • Check air pressure. • Correct if necessary.		√	√
11	*	Wheel bearings	• Check bearing for looseness or damage. • Replace if necessary.		√	√
12	*	Swingarm	• Check swingarm pivoting point for play. • Correct if necessary. • Lubricate with lithium soap base grease every 24,000 km or 24 months (whichever comes first).		√	√
13		Drive chain	• Check chain slack. • Adjust if necessary. Make sure that the rear wheel is properly aligned. • Clean and lubricate.	**Every 1,000 km and after washing the motorcycle or riding in rain**		
14	*	Steering bearings	• Check bearing play and steering for roughness. • Correct accordingly. • Lubricate with lithium soap base grease every 24,000 km or 24 months (whichever comes first).		√	√

PERIODIC MAINTENANCE/LUBRICATION INTERVALS

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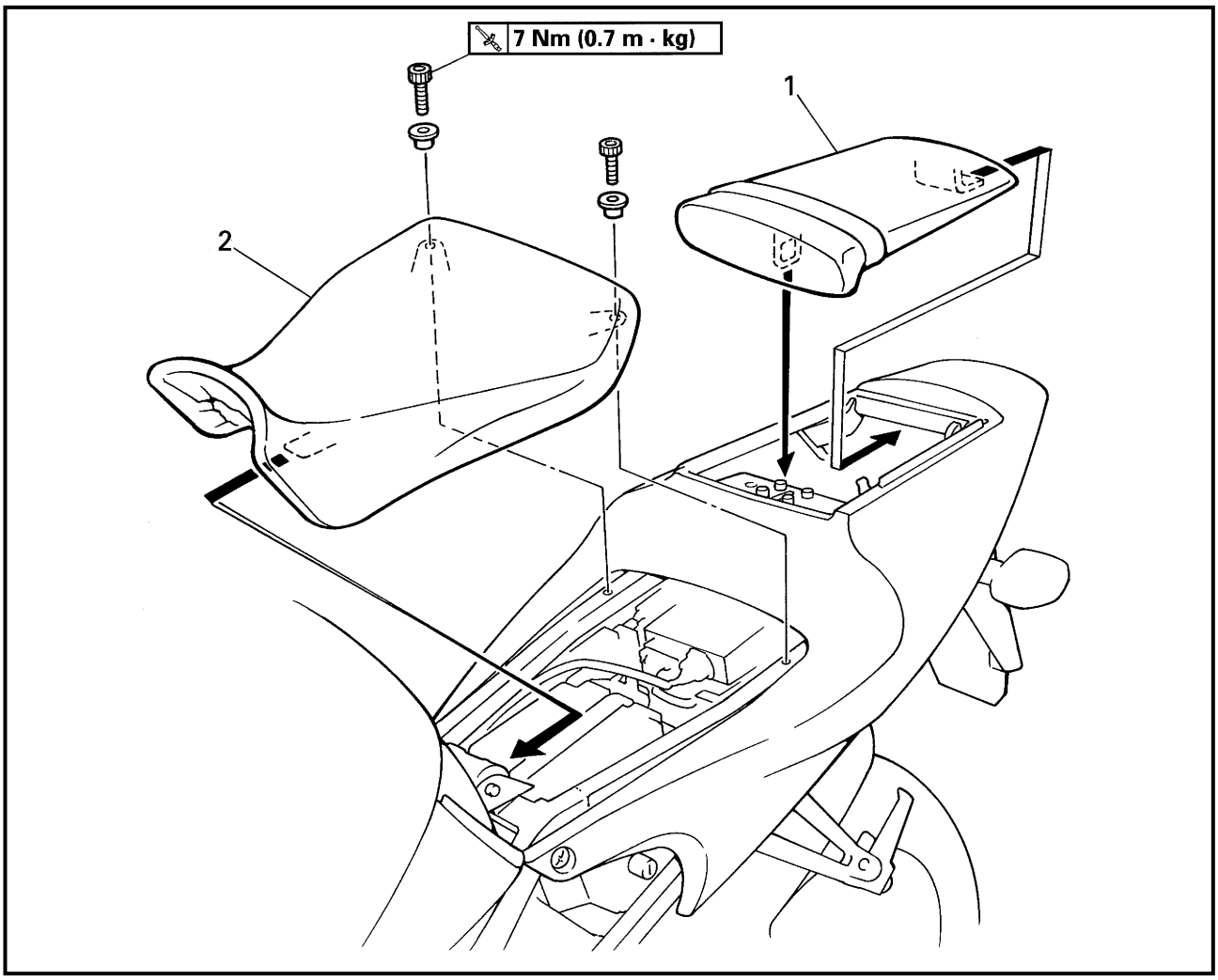
No.		ITEM	CHECKS AND MAINTENANCE JOBS	INITIAL (1,000 km)	EVERY	
					6,000 km or 6 months (whichever comes first)	12,000 km or 12 months (whichever comes first)
15	*	Chassis fasteners	• Make sure that all nuts, bolts and screws are properly tightened. • Tighten if necessary.		√	√
16		Sidestand	• Check operation. • Lubricate and repair if necessary.		√	√
17	*	Sidestand switch	• Check operation. • Replace if necessary.	√	√	√
18	*	Front fork	• Check operation and for oil leakage. • Correct accordingly.		√	√
19	*	Rear shock absorber assembly	• Check operation and shock absorber for oil leakage. • Replace shock absorber assembly if necessary.		√	√
20	*	Rear suspension relay arm and connecting arm pivoting points	• Check operation. • Lubricate with lithium soap base grease every 24,000 km or 24 months (whichever comes first).		√	√
21	*	Carburetors	• Check engine idling speed, synchronization and starter operation. • Adjust if necessary.	√	√	√
22		Engine oil	• Check oil level and vehicle for oil leakage. • Correct if necessary. • Change. (Warm engine before draining.)	√	√	√
23		Engine oil filter cartridge	• Replace.	√		√
24	*	Cooling system	• Check coolant level and vehicle for coolant leakage. • Correct if necessary. • Change coolant every 24,000 km or 24 months (whichever comes first).		√	√

***** Since these items require special tools, data and technical skills, they should be serviced by a Yamaha dealer.

NOTE:

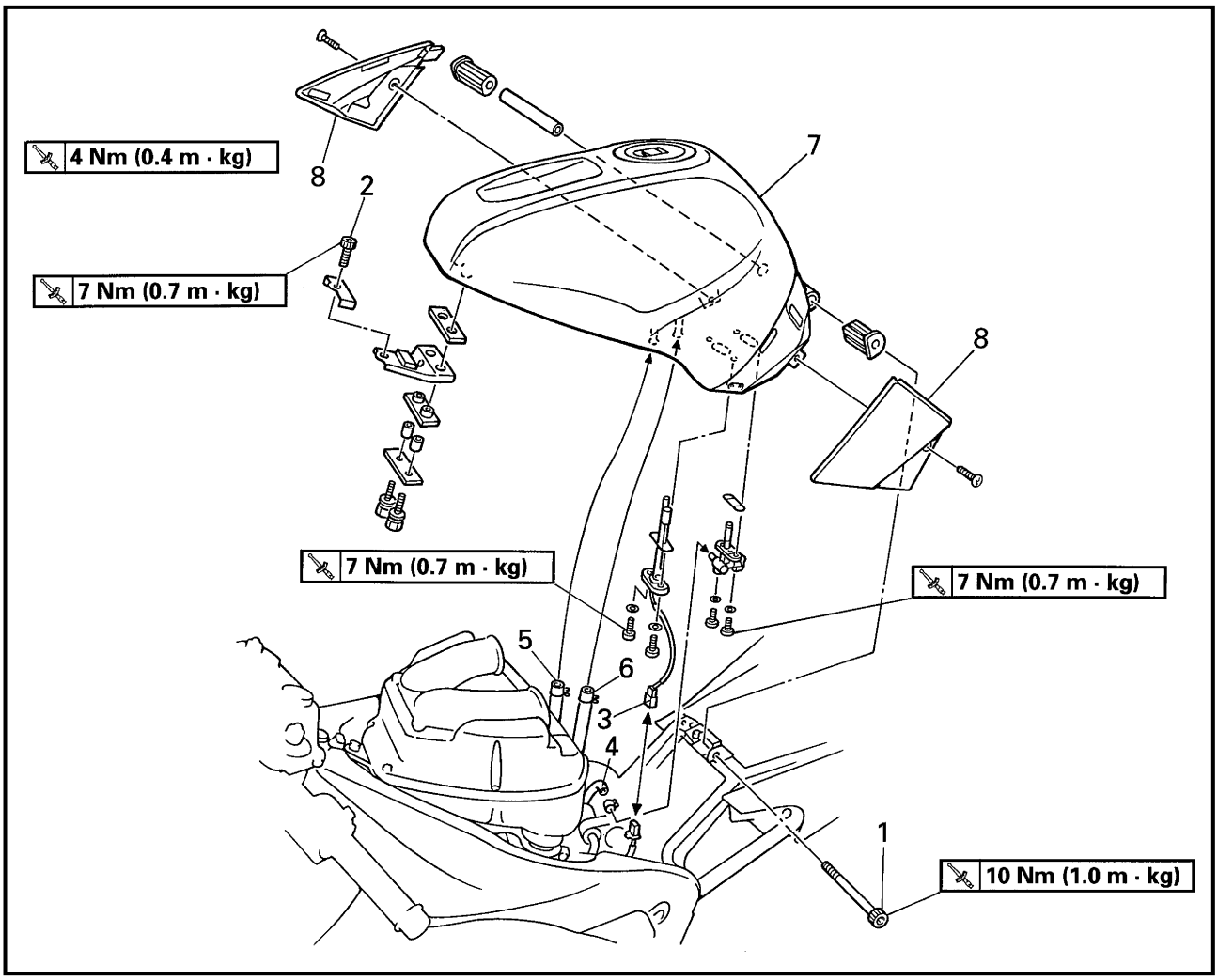
- The air filter element needs more frequent service if you are riding in unusually wet or dusty areas.
- Hydraulic brake system
 – Replace the brake fluid after disassembling the master cylinder or caliper cylinder.
 – Check the brake fluid level and add fluid as required.
 – Replace the master cylinder and caliper cylinder oil seals every two years.
 – Replace the brake hoses every four years, or if cracked or damaged.

EB302000
SEATS



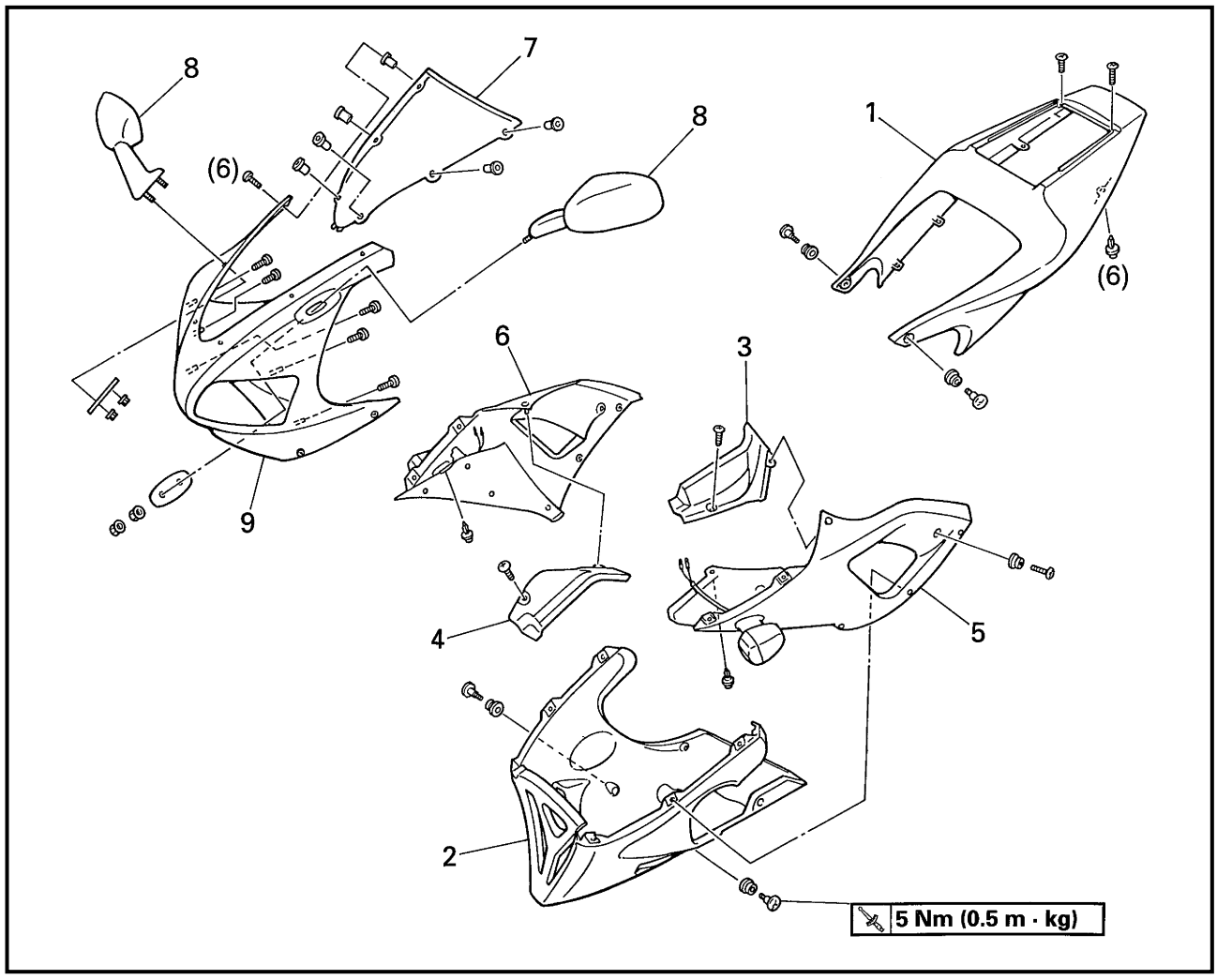
Order	Job/Part	Q'ty	Remarks
	Removing the seats		Remove the parts in the order listed.
1	Passenger seat	1	
2	Rider seat	1	
			For installation, reverse the removal procedure.

EB302010
FUEL TANK

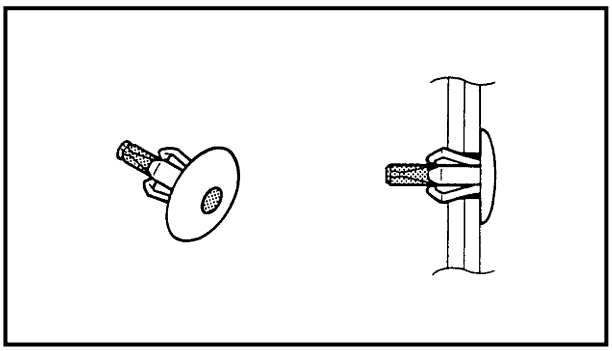


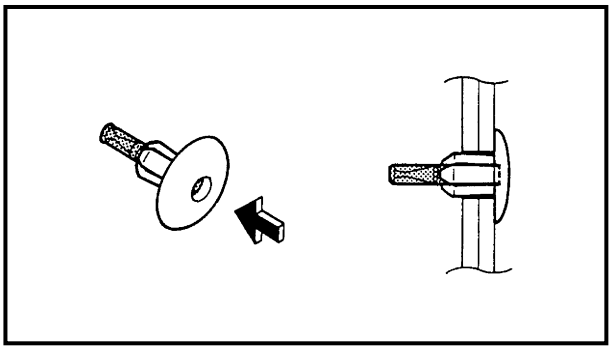
Order	Job/Part	Q'ty	Remarks
	Removing the fuel tank		Remove the parts in the order listed.
	Rider seat		Refer to "SEATS".
1	Bolt		
2	Bolt		
3	Fuel sender coupler		Disconnect.
4	Fuel hose		**NOTE:** Before disconnecting the fuel hose, set the fuel cock to "OFF".
5	Fuel tank overflow hose	1	
6	Fuel tank breather hose	1	
7	Fuel tank	1	
8	Fuel tank side panel	2	
			For installation, reverse the removal procedure.

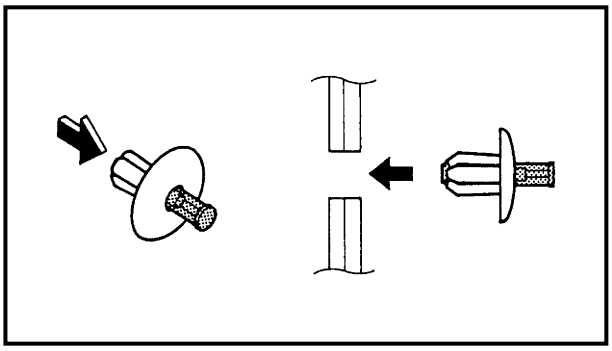
EB302020
COWLINGS

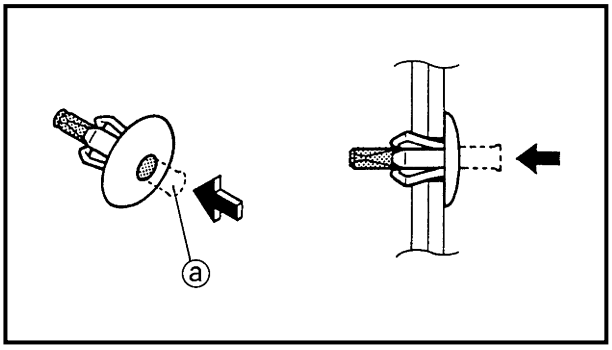


Order	Job/Part	Q'ty	Remarks
	Removing the cowlings		Remove the parts in the order listed.
	Rider and passenger seats		Refer to "SEATS".
1	Rear cowling	1	
2	Bottom cowling	1	
3	Front cowling inner panel (left)	1	
4	Front cowling inner panel (right)	1	
5	Left side cowling	1	
6	Right side cowling	1	
7	Windshield	1	
8	Rear view mirror	2	
9	Front cowling	1	
			For installation, reverse the removal procedure.









REMOVAL

1. Remove:
 - rear cowling
 - side cowlings

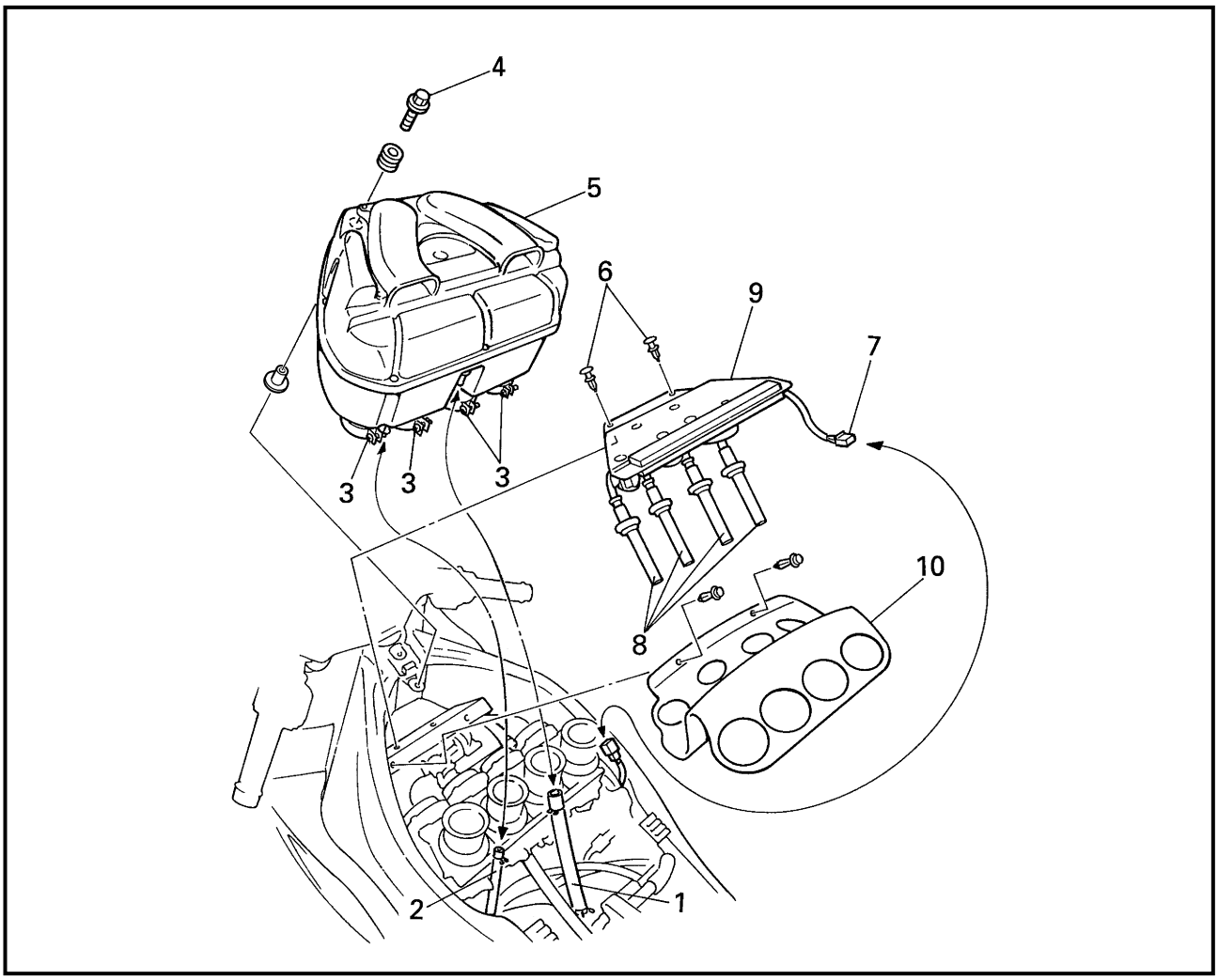
NOTE:
To remove the quick fastener, push its center in with a screwdriver, then pull the fastener out.

INSTALLATION

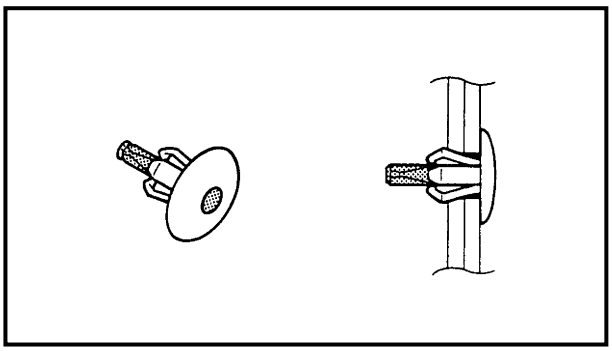
1. Install:
 - side cowlings
 - rear cowling

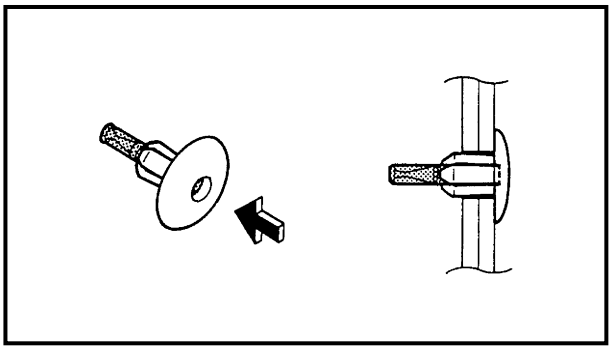
NOTE:
To install the quick fastener, push its pin so that it protrudes from the fastener head, then insert the fastener into the cowling and push the pin ⓐ in with a screwdriver. Make sure that the pin is flush with the fastener's head.

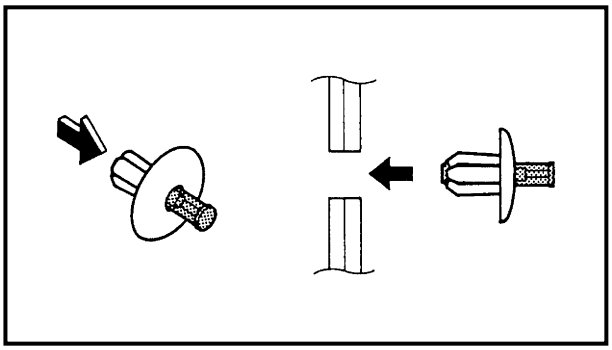
EB302040
AIR FILTER CASE AND IGNITION COIL PLATE

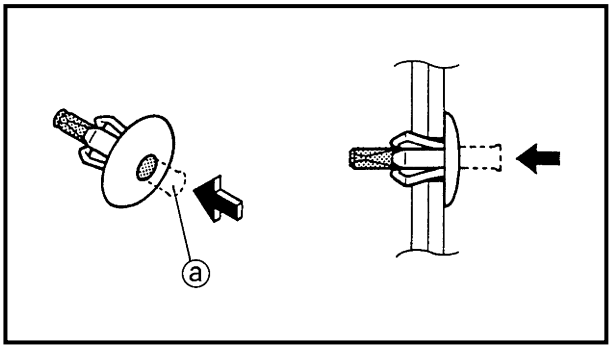


Order	Job/Part	Q'ty	Remarks
	Removing the air filter case and ignition coil plate		Remove the parts in the order listed.
	Rider seat and fuel tank		Refer to "SEATS" and "FUEL TANK".
1	Crankcase breather hose	1	
2	Air filter case breather hose	1	
3	Clamp screw	4	Loosen.
4	Bolt	1	
5	Air filter case	1	
6	Quick fastener	2	
7	Ignition coil coupler	1	Disconnect.
8	Spark plug cap	4	
9	Ignition coil plate/ignition coil	1/2	
10	Rubber baffle	1	
			For installation, reverse the removal procedure.









REMOVAL

1. Remove:
 • rubber baffle

NOTE:
To remove the quick fastener, push its center in with a screwdriver, then pull the fastener out.

INSTALLATION

1. Install:
 • rubber baffle

NOTE:
To install the quick fastener, push its pin so that it protrudes from the fastener head, then insert the fastener into the rubber baffle and push the pin ⓐ in with a screwdriver. Make sure that the pin is flush with the fastener's head.

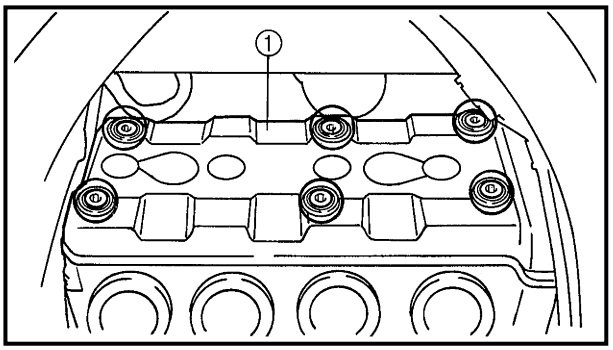
EB303001
ENGINE

ADJUSTING THE VALVE CLEARANCE

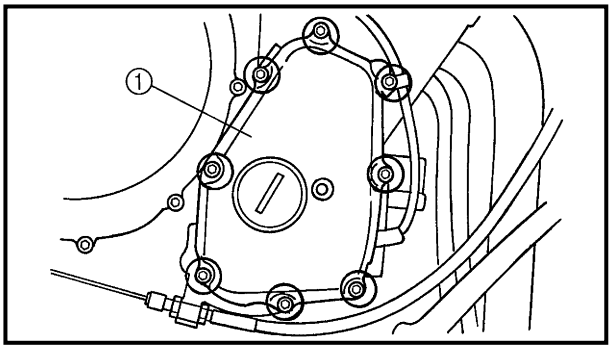
The following procedure applies to all of the valves.

NOTE:
- Valve clearance adjustment should be made on a cold engine, at room temperature.
- When the valve clearance is to be measured or adjusted, the piston must be at top dead center (TDC) on the compression stroke.

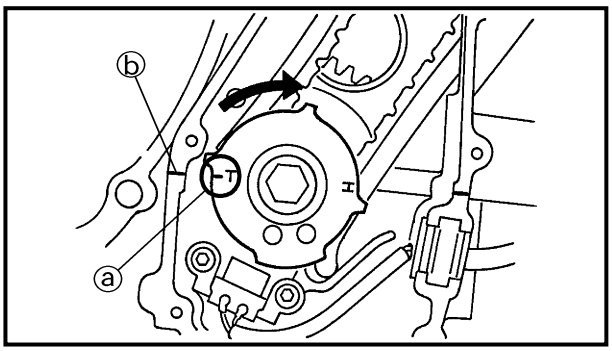
1. Remove:
 - rider seat
 - fuel tank
 Refer to "SEATS" and "FUEL TANK".
 - air filter case
 - rubber baffle
 Refer to "AIR FILTER CASE AND IGNITION COIL PLATE".
 - bottom cowling
 - side cowlings
 Refer to "COWLINGS".
 - carburetor assembly
 Refer to "CARBURETORS" in chapter 6.
 - radiator assembly
 - thermostat assembly
 Refer to "RADIATOR" and "THERMOSTAT ASSEMBLY" in chapter 5.

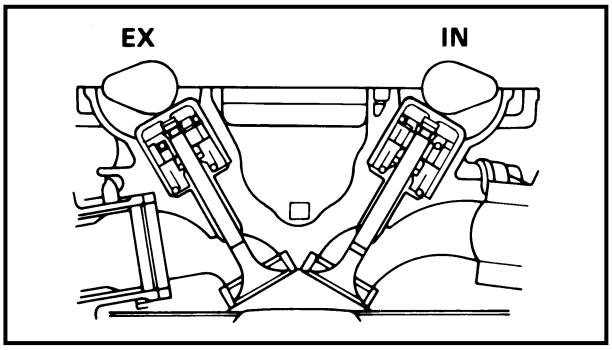


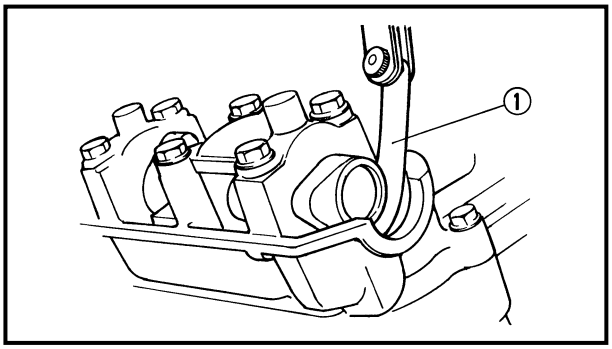
2. Remove:
 - spark plugs
 - cylinder head cover ①
 - cylinder head cover gasket

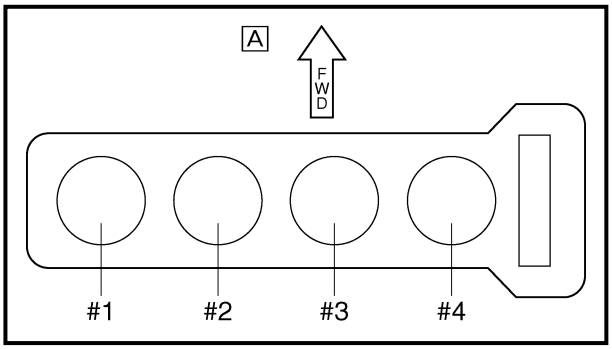


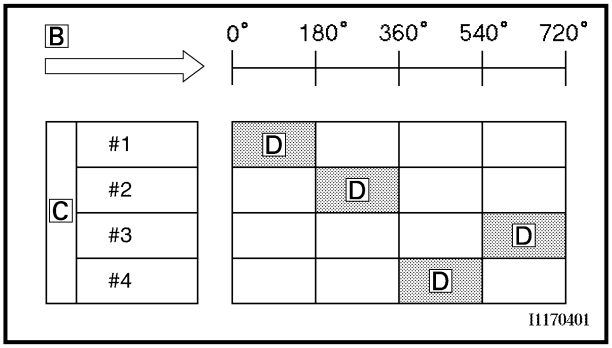
3. Remove:
 - pickup coil rotor cover ①











4. Measure:
 • valve clearance
 Out of specification → Adjust.

Valve clearance (cold)
Intake valve
0.11 ~ 0.20 mm
Exhaust valve
0.21 ~ 0.30 mm

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Turn the crankshaft clockwise.

b. When piston #1 is at TDC on the compression stroke, align the TDC mark ⓐ on the pickup coil rotor with the crankcase mating surface ⓑ.

NOTE:
TDC on the compression stroke can be found when the camshaft lobes are turned away from each other.

c. Measure the valve clearance with a thickness gauge ①.

NOTE:
• If the valve clearance is incorrect, record the measured reading.
• Measure the valve clearance in the following sequence.

Valve clearance measuring sequence
Cylinder #1 → #2 → #4 → #3

A Front

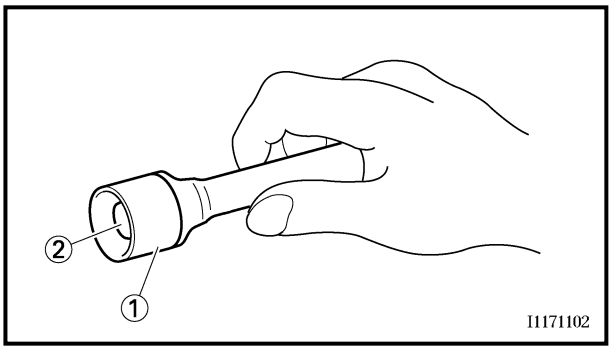
d. To measure the valve clearances of the other cylinders, starting with cylinder #1 at TDC, turn the crankshaft counterclockwise as specified in the following table.
B Degrees that the crankshaft is turned counterclockwise
C Cylinder
D Combustion cycle

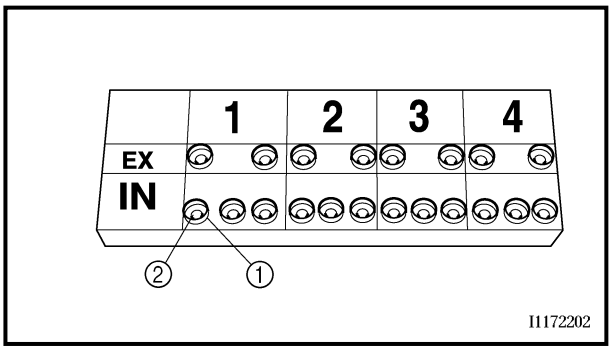
Cylinder #2	**180˚**
Cylinder #4	**360˚**
Cylinder #3	**540˚**

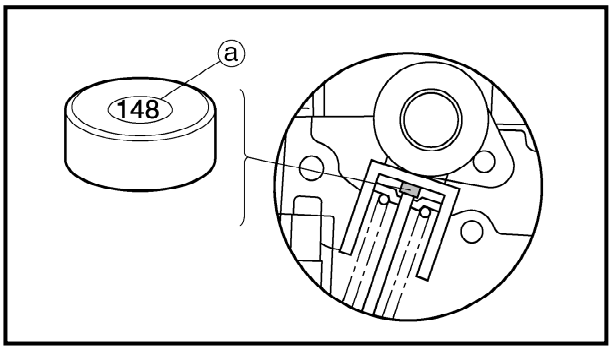
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5. Remove:
 - timing chain tensioner
 - timing chain guide (exhaust side)
 - intake camshaft caps
 - exhaust camshaft caps
 - timing chain (from the camshaft sprockets)
 - intake camshaft
 - exhaust camshaft

NOTE:
- Refer to "CAMSHAFTS" in chapter 4.
- When removing the timing chain and camshafts, fasten the timing chain with a wire to retrieve it if it falls into the crankcase.







6. Adjust:
 - valve clearance

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Remove the valve lifter ① and the valve pad ②.

NOTE:
- Cover the timing chain opening with a rag to prevent the valve pad from falling into the crankcase.
- Make a note of the position of each valve lifter ① and valve pad ② so that they can be installed in the correct place.

b. Select the proper valve pad from the following table.

Valve pad thickness range		Available valve pads
Nos. 120 ~ 240	1.20 ~ 2.40 mm	25 thicknesses in 0.05 mm increments

NOTE:
- The thickness ⓐ of each valve pad is marked in hundredths of millimeters on the side that touches the valve lifter.
- Since valve pads of various sizes are originally installed, the valve pad number must be rounded in order to reach the closest equivalent to the original.

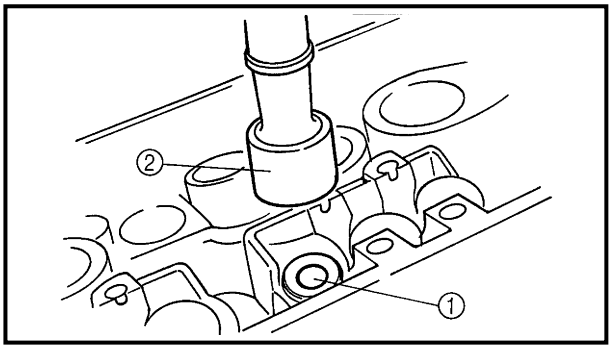
c. Round off the original valve pad number according to the following table.

Last digit	Rounded value
0 or 2	0
5	5
8	10

EXAMPLE:
Original valve pad number = 148 (thickness = 1.48 mm)
Rounded value = 150

d. Locate the rounded number of the original valve pad and the measured valve clearance in the valve pad selection table. The point where the column and row intersect is the new valve pad number.

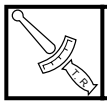
NOTE:
The new valve pad number is only an approximation. The valve clearance must be measured again and the above steps should be repeated if the measurement is still incorrect.



e. Install the new valve pad ① and the valve lifter ②.

NOTE:
- Lubricate the valve pad with molybdenum disulfide grease.
- Lubricate the valve lifter with molybdenum disulfide oil.
- The valve lifter must turn smoothly when rotated by hand.
- Install the valve lifter and the valve pad in the correct place.

f. Install the exhaust and intake camshafts, timing chain and camshaft caps.



Camshaft cap bolt
10 Nm (1.0 m • kg)

NOTE:
- Refer to “CAMSHAFTS” in chapter 4.
- Lubricate the camshaft lobes and camshaft journals.
- First, install the exhaust camshaft.
- Align the camshaft marks with the camshaft cap marks.
- Turn the crankshaft counterclockwise several full turns to seat the parts.

VALVE PAD SELECTION TABLE

INTAKE

B MEASURED VALVE CLEARANCE	A ORIGINAL VALVE PAD NUMBER																									
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.00 ~ 0.02				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	
0.03 ~ 0.07			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	
0.08 ~ 0.10		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	
0.11 ~ 0.20	C STANDARD CLEARANCE																									
0.21 ~ 0.22	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.23 ~ 0.27	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.28 ~ 0.32	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.33 ~ 0.37	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.38 ~ 0.42	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.43 ~ 0.47	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.48 ~ 0.52	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.53 ~ 0.57	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.58 ~ 0.62	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.63 ~ 0.67	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.68 ~ 0.72	175	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.73 ~ 0.77	180	185	190	195	200	205	210	215	220	225	230	235	240													
0.78 ~ 0.82	185	190	195	200	205	210	215	220	225	230	235	240														
0.83 ~ 0.87	190	195	200	205	210	215	220	225	230	235	240															
0.88 ~ 0.92	195	200	205	210	215	220	225	230	235	240																
0.93 ~ 0.97	200	205	210	215	220	225	230	235	240																	
0.98 ~ 1.02	205	210	215	220	225	230	235	240																		
1.03 ~ 1.07	210	215	220	225	230	235	240																			
1.08 ~ 1.12	215	220	225	230	235	240																				
1.13 ~ 1.17	220	225	230	235	240																					
1.18 ~ 1.22	225	230	235	240																						
1.23 ~ 1.27	230	235	240																							
1.28 ~ 1.32	235	240																								
1.33 ~ 1.37	240																									

Example:
Valve Clearance (cold)
0.11 ~ 0.20 mm
Rounded value 150
Measured valve clearance is 0.24 mm
Replace pad 150 with pad 160
Pad No. 150 = 1.50 mm
Pad No. 160 = 1.60 mm
Always install the valve pad with the number facing down.

EXHAUST

B MEASURED VALVE CLEARANCE	A ORIGINAL VALVE PAD NUMBER																									
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.00 ~ 0.02						120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	
0.03 ~ 0.07					120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	
0.08 ~ 0.12				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	
0.13 ~ 0.17			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	
0.18 ~ 0.20		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	
0.21 ~ 0.30	C STANDARD CLEARANCE																									
0.31 ~ 0.32	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.33 ~ 0.37	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.38 ~ 0.42	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.43 ~ 0.47	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.48 ~ 0.52	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.53 ~ 0.57	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.58 ~ 0.62	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.63 ~ 0.67	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.68 ~ 0.72	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.73 ~ 0.77	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.78 ~ 0.82	175	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.83 ~ 0.87	180	185	190	195	200	205	210	215	220	225	230	235	240													
0.88 ~ 0.92	185	190	195	200	205	210	215	220	225	230	235	240														
0.93 ~ 0.97	190	195	200	205	210	215	220	225	230	235	240															
0.98 ~ 1.02	195	200	205	210	215	220	225	230	235	240																
1.03 ~ 1.07	200	205	210	215	220	225	230	235	240																	
1.08 ~ 1.12	205	210	215	220	225	230	235	240																		
1.13 ~ 1.17	210	215	220	225	230	235	240																			
1.18 ~ 1.22	215	220	225	230	235	240																				
1.23 ~ 1.27	220	225	230	235	240																					
1.28 ~ 1.32	225	230	235	240																						
1.33 ~ 1.37	230	235	240																							
1.38 ~ 1.42	235	240																								
1.43 ~ 1.47	240																									

Example:
Valve Clearance (cold)
0.21 ~ 0.30 mm
Rounded value 175
Measured valve clearance is 0.35 mm
Replace pad 150 with pad 185
Pad No. 175 = 1.75 mm
Pad No. 185 = 1.85 mm
Always install the valve pad with the number facing down.

g. Measure the valve clearance again.

h. If the valve clearance is still out of specification, repeat all of the valve clearance adjustment steps until the specified clearance is obtained.

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7. Install:
 • all removed parts

NOTE:
For installation, reverse the removal procedure. Note the following points.

8. Install:
 • timing chain guide (exhaust side)
 • timing chain tensioner
 • pickup coil rotor cover
 • cylinder head cover
 • spark plugs
 Refer to "CAMSHAFTS" in chapter 4.

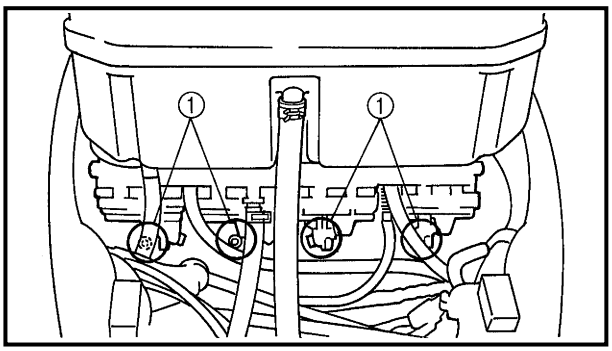
EB303010
SYNCHRONIZING THE CARBURETORS

NOTE:
Prior to synchronizing the carburetors, the valve clearance and the engine idling speed should be properly adjusted and the ignition timing should be checked.

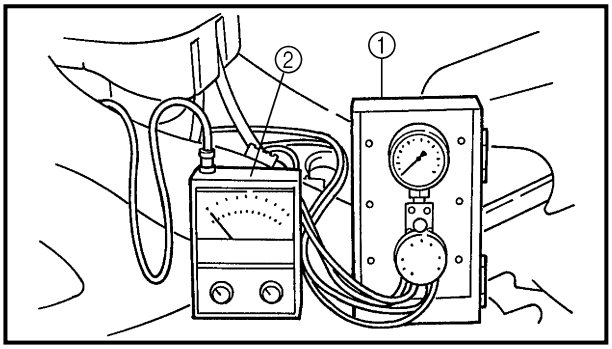
1. Stand the motorcycle on a level surface.

NOTE:
Place the motorcycle on a suitable stand.

2. Remove:
 • rider seat
 • fuel tank
 • Refer to "SEATS" and "FUEL TANK".



3. Remove:
 • bolts ①
 • copper washers



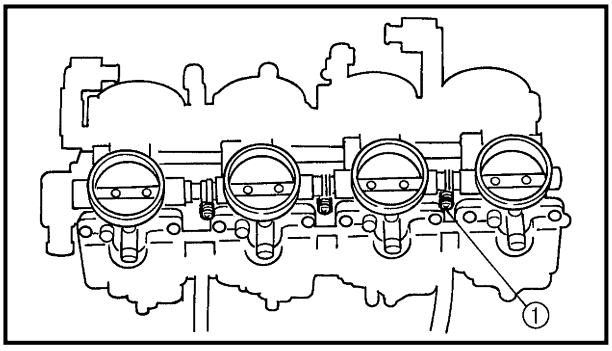
4. Install:
 • vacuum gauge attachments (into the bolt holes)
 • vacuum gauge ① (onto the vacuum gauge attachments)
 • engine tachometer ② (onto the spark plug lead of cylinder #1)

Vacuum gauge
90890-03094
Vacuum gauge attachment
90890-03060
Engine tachometer
90890-03113

5. Start the engine and let it warm up for several minutes.

6. Measure:
 • engine idling speed
 Out of specification → Adjust.
 Refer to "ADJUSTING THE ENGINE IDLING SPEED".

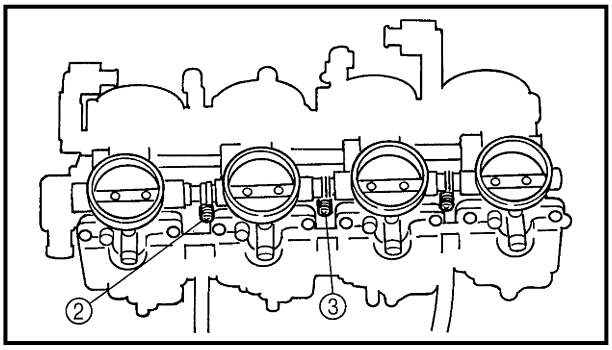
Engine idling speed
1,050 ~ 1,150 r/min



7. Adjust:
 • carburetor synchronization

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a. Synchronize carburetor #1 to carburetor #2 by turning the synchronizing screw ① in either direction until both gauges read the same.



NOTE:
After each step, rev the engine two or three times, each time for less than a second, and check the synchronization again.

b. Synchronize carburetor #4 to carburetor #3 by turning the synchronizing screw ② in either direction until both gauges read the same.

c. Synchronize carburetor #2 to carburetor #3 by turning the synchronizing screw ③ in either direction until both gauges read the same.

Vacuum pressure at engine idling speed
29.3 kPa (0.293 kg/cm², 220 mm Hg)

NOTE:
The difference in vacuum pressure between two carburetors should not exceed 1.33 kPa (10 mm Hg).

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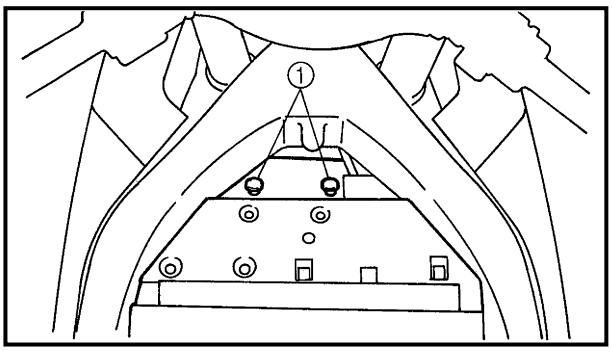
8. Measure:
 • engine idling speed
 Out of specification → Adjust.
9. Stop the engine and remove the measuring equipment.
10. Adjust:
 • throttle cable free play
 Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY".

Throttle cable free play (at the flange of the throttle grip)
3 ~ 5 mm

EB303020
ADJUSTING THE ENGINE IDLING SPEED

NOTE:
Prior to adjusting the engine idling speed, the carburetor synchronization should be adjusted properly, the air filter element should be clean, and the engine should have adequate compression.

1. Start the engine and let it warm up for several minutes.



2. Remove:
 • air filter case
 • quick fasteners ①
 Refer to "AIR FILTER CASE AND IGNITION COIL PLATE".

3. Install:
 • engine tachometer
 (onto the spark plug lead of cylinder #1)

	Engine tachometer 90890-03113

4. Install:
 • air filter case
 Refer to "AIR FILTER CASE AND IGNITION COIL PLATE".

5. Measure:
 • engine idling speed
 Out of specification → Adjust.

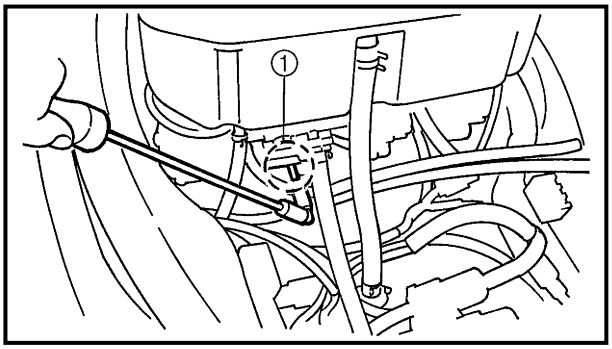
	Engine idling speed 1,050 ~ 1,150 r/min

6. Adjust:
 • engine idling speed

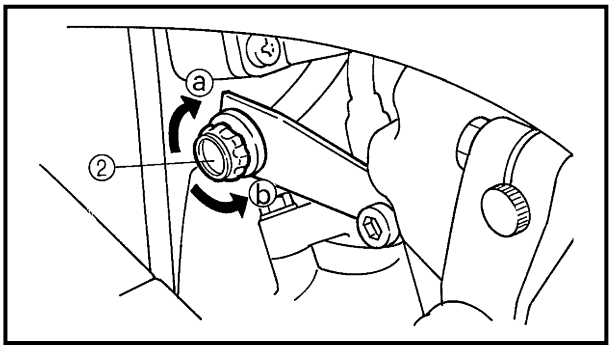
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a. Turn the pilot screw ① in until it is lightly seated.

b. Turn the pilot screw out the specified number of turns.



	Carburetor angle driver 90890-03158
	Pilot screw setting 2-1/2 turns out



c. Turn the throttle stop screw ② in direction ⓐ or ⓑ until the specified engine idling speed is obtained.

Direction ⓐ	**Engine idling speed is increased.**
Direction ⓑ	**Engine idling speed is decreased.**

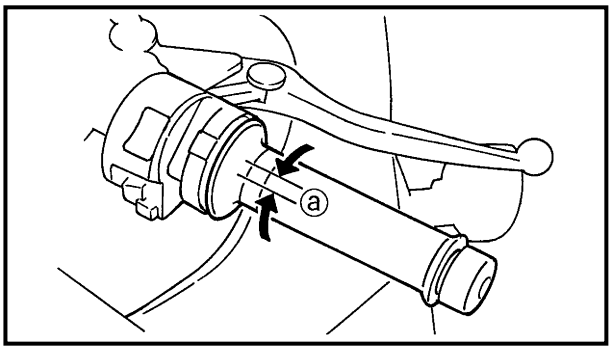
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7. Adjust:
 • throttle cable free play
 Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY".

Throttle cable free play (at the flange of the throttle grip)
3 ~ 5 mm

EB303031
ADJUSTING THE THROTTLE CABLE FREE PLAY

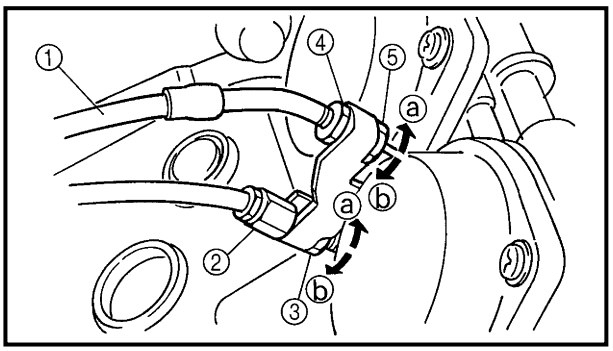
NOTE:
Prior to adjusting the throttle cable free play, the engine idling speed and carburetor synchronization should be adjusted properly.



1. Measure:
 • throttle cable free play ⓐ
 Out of specification → Adjust.

Throttle cable free play (at the flange of the throttle grip)
3 ~ 5 mm

2. Remove:
 • rider seat
 • fuel tank
 Refer to "SEATS" and "FUEL TANK".
 • air filter case
 • ignition coil plate
 (along with the ignition coils)
 • rubber baffle
 Refer to "AIR FILTER CASE AND IGNITION COIL PLATE".



3. Adjust:
 • throttle cable free play

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NOTE:
When the throttle is opened, the accelerator cable ① is pulled.

Carburetor side

a. Loosen the locknut ② on the decelerator cable.

b. Turn the adjusting nut ③ in direction ⓐ or ⓑ to take up any slack on the decelerator cable.

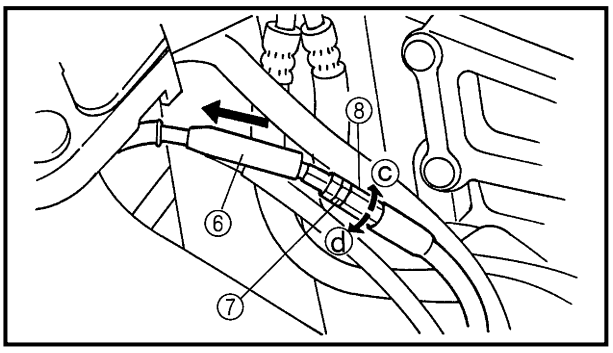
c. Loosen the locknut ④ on the accelerator cable.

d. Turn the adjusting nut ⑤ in direction ⓐ or ⓑ until the specified throttle cable free play is obtained.

Direction ⓐ	**Throttle cable free play is increased.**
Direction ⓑ	**Throttle cable free play is decreased.**

e. Tighten the locknuts.

NOTE:
If the specified throttle cable free play cannot be obtained on the carburetor side of the cable, use the adjusting nut on the handlebar side.



Handlebar side

a. Slide back the rubber cover ⑥.

b. Loosen the locknut ⑦.

c. Turn the adjusting nut ⑧ in direction ⓒ or ⓓ until the specified throttle cable free play is obtained.

Direction ⓒ	**Throttle cable free play is increased.**
Direction ⓓ	**Throttle cable free play is decreased.**

d. Tighten the locknut.

⚠ WARNING

After adjusting the throttle cable free play, start the engine and turn the handlebars to the right and to the left to ensure that this does not cause the engine idling speed to change.

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EB303040
CHECKING THE SPARK PLUGS

The following procedure applies to all of the spark plugs.

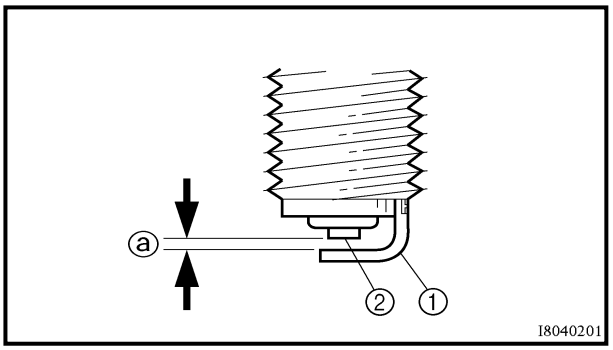
1. Remove:
 - rider seat
 - fuel tank
 Refer to "SEATS" and "FUEL TANK".
 - air filter case
 - ignition coil plate
 (along with the ignition coils)
 Refer to "AIR FILTER CASE AND IGNITION COIL PLATE".
2. Disconnect:
 - spark plug cap
3. Remove:
 - spark plug

CAUTION:

Before removing the spark plugs, blow away any dirt accumulated in the spark plug wells with compressed air to prevent it from falling into the cylinders.

4. Check:
 - spark plug type
 Incorrect → Change.

Spark plugs
Model (manufacturer)
CR9E (NGK)
U27ESR-N (DENSO)



5. Check:
 - electrodes ①
 Damage/wear → Replace the spark plug.
 - insulator ②
 Abnormal color → Replace the spark plug.
 Normal color is medium-to-light tan.
6. Clean:
 - spark plug
 (with a spark plug cleaner or wire brush)
7. Measure:
 - spark plug gap ⓐ
 (with a wire gauge)
 Out of specification → Regap.

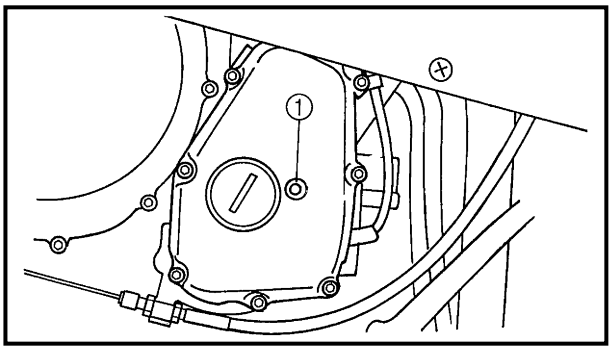
Spark plug gap
0.7 ~ 0.8 mm

8. Install:
 • spark plug — **13 Nm (1.3 m · kg)**

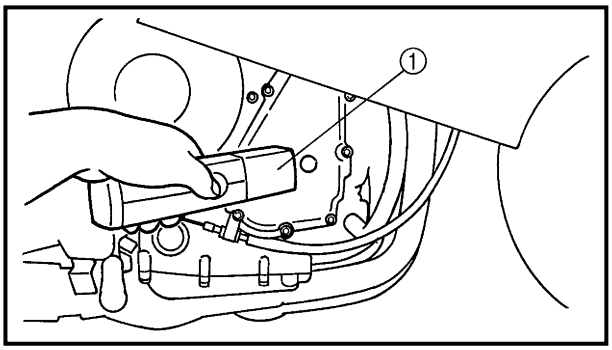
NOTE:
Before installing the spark plug, clean the spark plug and gasket surface.

EB303050
CHECKING THE IGNITION TIMING

NOTE:
Prior to checking the ignition timing, check the wiring connections of the entire ignition system. Make sure that all connections are tight and free of corrosion.



1. Remove:
 • bottom cowling
 Refer to "COWLINGS".
 • rider seat
 • fuel tank
 Refer to "SEATS" and "FUEL TANK".
 • air filter case
 Refer to "AIR FILTER CASE AND IGNITION COIL PLATE".
 • timing mark accessing screw ①



2. Install:
 • timing light ①
 • engine tachometer
 (onto the spark plug lead of cylinder #1)

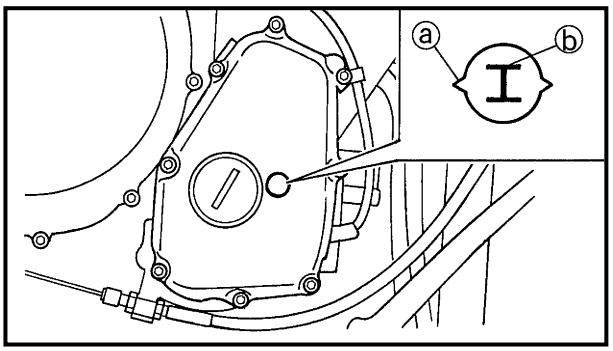
Timing light
90890-03141
Engine tachometer
90890-03113

3. Check:
 • ignition timing

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a. Start the engine, warm it up for several minutes, and then let it run at the specified engine idling speed.

Engine idling speed
1,050 ~ 1,150 r/min



b. Check that the mark ⓐ is within the required firing range ⓑ on the pickup coil rotor.
Incorrect firing range → Check the ignition system.

NOTE:
The ignition timing is not adjustable.

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EB303060

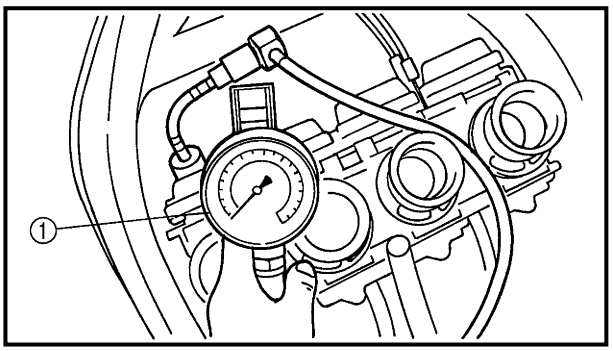
MEASURING THE COMPRESSION PRESSURE

The following procedure applies to all of the cylinders.

NOTE:
Insufficient compression pressure will result in a loss of performance.

1. Measure:
 • valve clearance
 Out of specification → Adjust.
 Refer to "ADJUSTING THE VALVE CLEARANCE".
2. Start the engine, warm it up for several minutes, and then stop it.
3. Remove:
 • rider seat
 • fuel tank
 Refer to "SEATS" and "FUEL TANK".
 • air filter case
 • ignition coil plate
 (along with the ignition coils)
 • rubber baffle
 Refer to "AIR FILTER CASE AND IGNITION COIL PLATE".
4. Remove:
 • spark plug

CAUTION:
Before removing the spark plugs, use compressed air to blow away any dirt accumulated in the spark plug wells to prevent it from falling into the cylinders.



5. Install:
 • compression gauge ①

Compression gauge
90890-03081
Adapter
90890-04136

6. Measure:
 • compression pressure
 Out of specification → Refer to steps (c) and (d).

Compression pressure (at sea level)
Minimum
1,350 kPa (13.5 kg/cm², 13.5 bar)
Standard
1,450 kPa (14.5 kg/cm², 14.5 bar)
Maximum
1,500 kPa (15.0 kg/cm², 15.0 bar)

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a. Set the main switch to "ON".

b. With the throttle wide open, crank the engine until the reading on the compression gauge stabilizes.

⚠ WARNING

To prevent sparking, ground all spark plug leads before cranking the engine.

NOTE:
The difference in compression pressure between cylinders should not exceed 100 kPa (1 kg/cm², 1 bar).

c. If the compression pressure is above the maximum specification, check the cylinder head, valve surfaces, and piston crown for carbon deposits.
Carbon deposits → Eliminate.

d. If the compression pressure is below the minimum specification, squirt a few drops of oil into the cylinder and measure again.

Refer to the following table.

Compression pressure (with oil applied into the cylinder)	
Reading	**Diagnosis**
Higher than without oil	**Piston wear or damage → Repair.**
Same as without oil	**Piston ring(-s), valve(-s), cylinder head gasket or piston possibly defective → Repair.**

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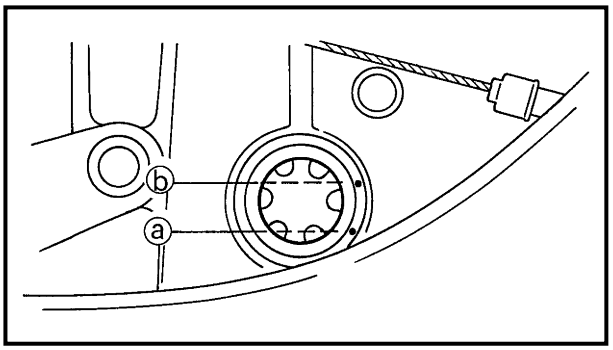
7. Install:
 • spark plug — **13 Nm (1.3 m · kg)**

EB303070
CHECKING THE ENGINE OIL LEVEL

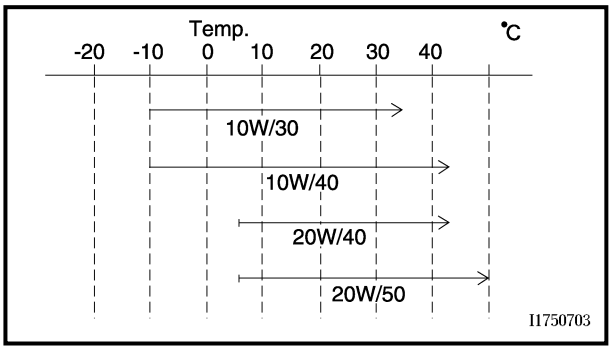
1. Stand the motorcycle on a level surface.

NOTE:
- Place the motorcycle on a suitable stand.
- Make sure that the motorcycle is upright.

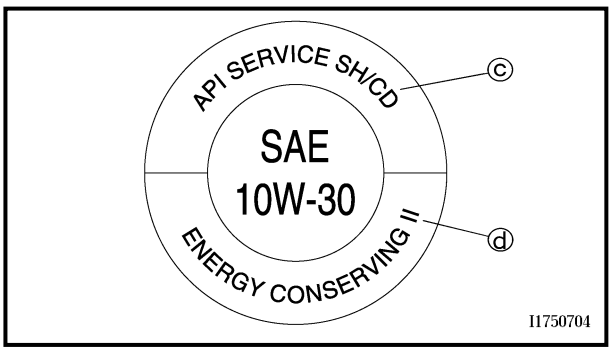
2. Start the engine, let it idle for several minutes, and then stop it.



3. Check:
 • engine oil level
 The engine oil level should be between the minimum level mark ⓐ and maximum level mark ⓑ.
 Below the minimum level mark → Add the recommended engine oil to the proper level.



Recommended oil
Refer to the chart for the engine oil grade which is best suited for certain atmospheric temperatures.
API standard
SE or higher grade
(Non-Friction modified)

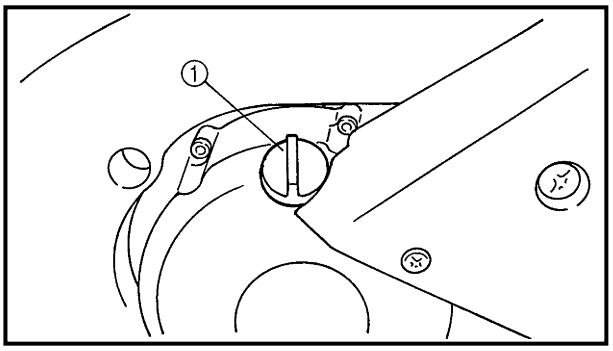


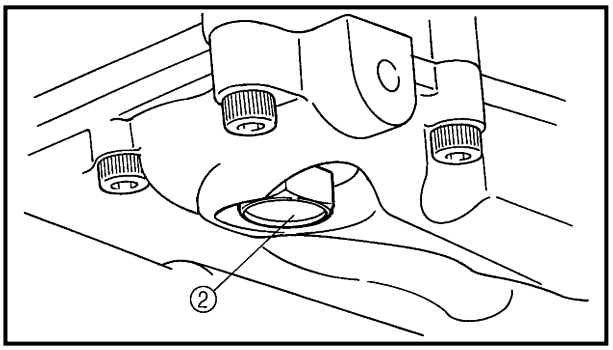
CAUTION:

- **Engine oil also lubricates the clutch and the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives or use engine oils with a grade of CD ⓒ or higher and do not use oils labeled "ENERGY CONSERVING II" ⓓ or higher.**
- **Do not allow foreign materials to enter the crankcase.**

4. Start the engine, warm it up for several minutes, and then turn it off.
5. Check:
 - engine oil level

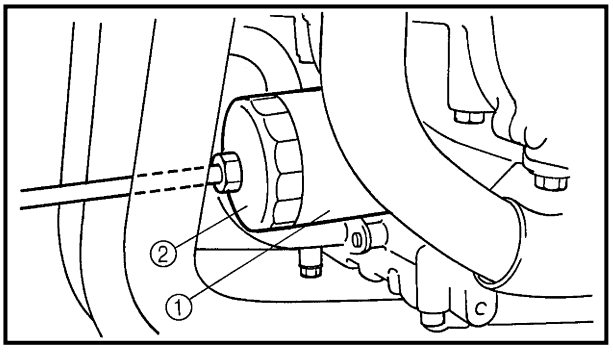
NOTE:
Before checking the engine oil level, wait a few minutes until the oil has settled.





EB303081
CHANGING THE ENGINE OIL

1. Remove:
 - bottom cowling
 Refer to "COWLINGS".
2. Start the engine, warm it up for several minutes, and then turn it off.
3. Place a container under the engine oil drain bolt.
4. Remove:
 - engine oil filler cap ①
 - engine oil drain bolt ②
 (along with the washer)
5. Drain:
 - engine oil
 (completely from the crankcase)

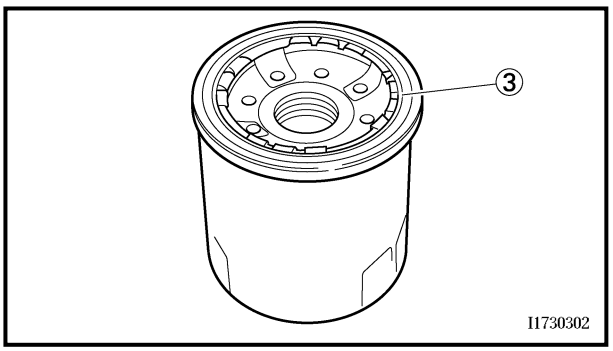


6. If the oil filter cartridge is also to be replaced, perform the following procedure.

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a. Remove the oil filter cartridge ① with an oil filter wrench ②.

	**Oil filter wrench** **90890-01426**



b. Lubricate the O-ring ③ of the new oil filter cartridge with a thin coat of engine oil.

CAUTION:

Make sure that the O-ring ③ is positioned correctly in the groove of the oil filter cartridge.

c. Tighten the new oil filter cartridge to specification with an oil filter wrench.

Oil filter cartridge
17 Nm (1.7 m • kg)

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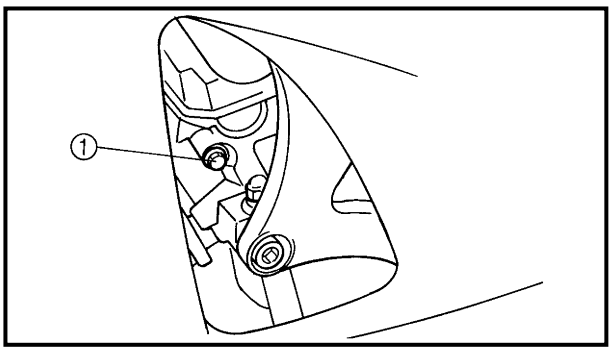
7. Check:
 • engine oil drain bolt washer
 Damage → Replace.
8. Install:
 • engine oil drain bolt

43 Nm (4.3 m · kg)

9. Fill:
 • crankcase
 (with the specified amount of the recommended engine oil)

Quantity
Total amount
3.6 L (3.2 Imp qt)
Without oil filter cartridge replacement
2.7 L (2.4 Imp qt)
With oil filter cartridge replacement
2.9 L (2.6 Imp qt)

10. Install:
 • engine oil filler cap
11. Start the engine, warm it up for several minutes, and then turn it off.
12. Check:
 • engine
 (for engine oil leaks)
13. Check:
 • engine oil level
 Refer to “CHECKING THE ENGINE OIL LEVEL”.
14. Install:
 • bottom cowling
 Refer to “COWLINGS”.



15.Check:
• engine oil pressure

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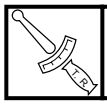
a. Slightly loosen the oil gallery bolt ①.

b. Start the engine and keep it idling until engine oil starts to seep from the oil gallery bolt. If no engine oil comes out after one minute, turn the engine off so that it will not seize.

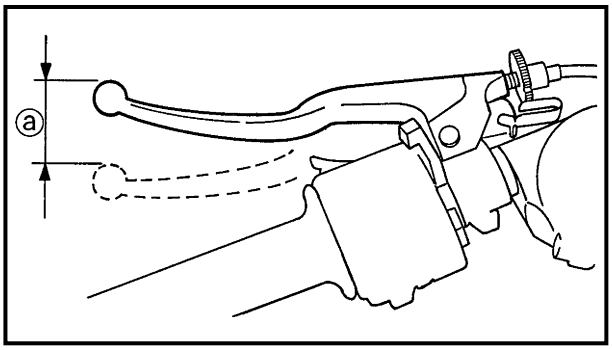
c. Check the engine oil passages, the oil filter cartridge and the oil pump for damage or leakage. Refer to "OIL PAN AND OIL PUMP" in chapter 4.

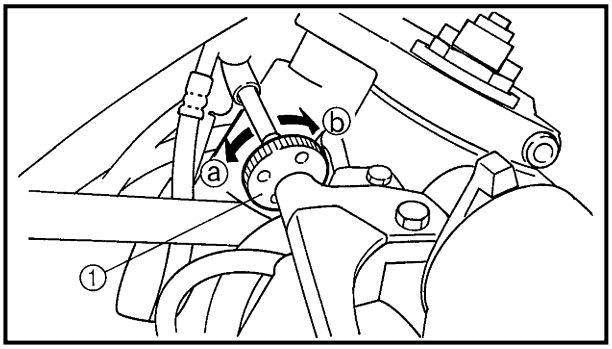
d. Start the engine after solving the problem(-s) and check the engine oil pressure again.

e. Tighten the oil gallery bolt to specification.

	**Oil gallery bolt** **20 Nm (2.0 m • kg)**

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EB303100
ADJUSTING THE CLUTCH CABLE FREE PLAY

1. Measure:
 • clutch cable free play ⓐ
 Out of specification → Adjust.

	Clutch cable free play (at the end of the clutch lever) **10 ~ 15 mm**

2. Adjust:
 • clutch cable free play

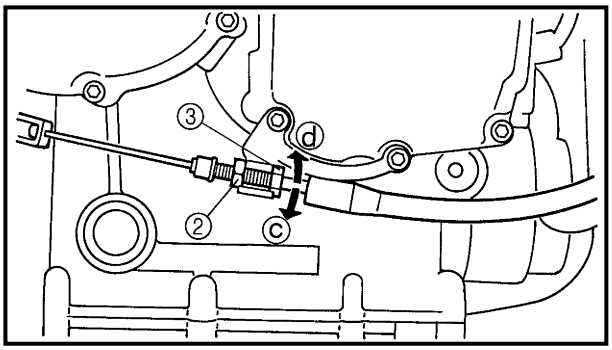
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Handlebar side

a. Turn the adjusting bolt ① in direction ⓐ or ⓑ until the specified clutch cable free play is obtained.

Direction ⓐ	**Clutch cable free play is increased.**
Direction ⓑ	**Clutch cable free play is decreased.**

NOTE:
If the specified clutch cable free play cannot be obtained on the handlebar side of the cable, use the adjusting nut on the engine side.



Engine side

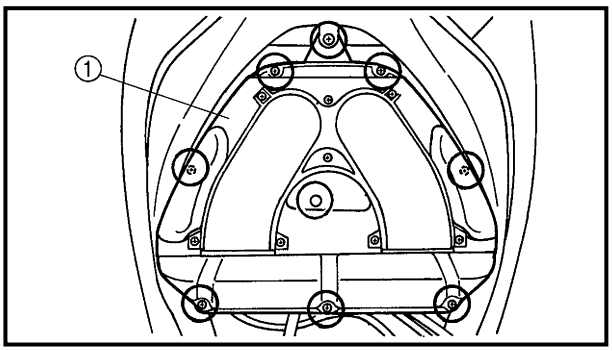
a. Loosen the locknut ②.

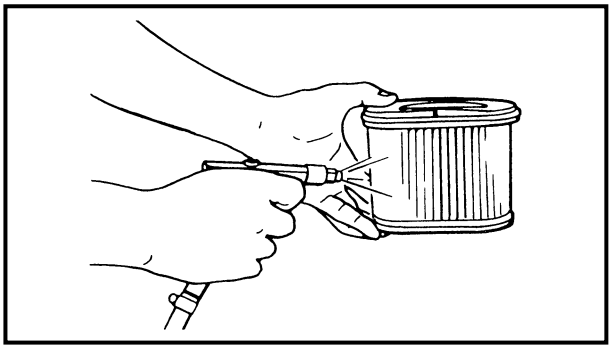
b. Turn the adjusting nut ③ in direction ⓒ or ⓓ until the specified clutch cable free play is obtained.

Direction ⓒ	**Clutch cable free play is increased.**
Direction ⓓ	**Clutch cable free play is decreased.**

c. Tighten the locknut.

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EB303130
CLEANING THE AIR FILTER ELEMENT

1. Remove:
 • fuel tank
 Refer to “FUEL TANK”.
 • air filter case cover ①
 • air filter element
2. Clean:
 • air filter element
 Apply compressed air to the outer surface of the air filter element.
3. Check:
 • air filter element
 Damage → Replace.
4. Install:
 • air filter element
 • air filter case cover

CAUTION:

Never operate the engine without the air filter element installed. Unfiltered air will cause rapid wear of engine parts and may damage the engine. Operating the engine without the air filter element will also affect the carburetor tuning, leading to poor engine performance and possible overheating.

NOTE:

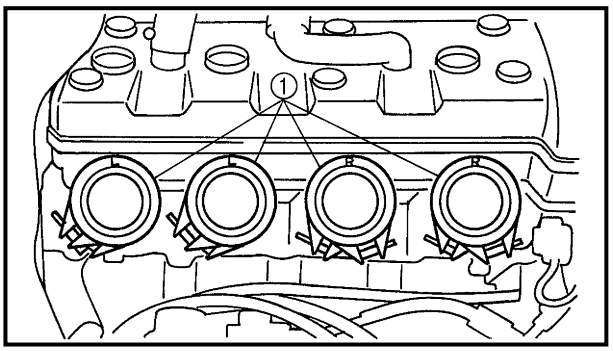
When installing the air filter element into the air filter case cover, make sure that their sealing surfaces are aligned to prevent any air leaks.

5. Install:
 • fuel tank
 Refer to “FUEL TANK”.

EB303171
CHECKING THE CARBURETOR JOINTS

The following procedure applies to all of the carburetor joints and intake manifolds.

1. Remove:
 • carburetor assembly
 Refer to “CARBURETORS” in chapter 6.

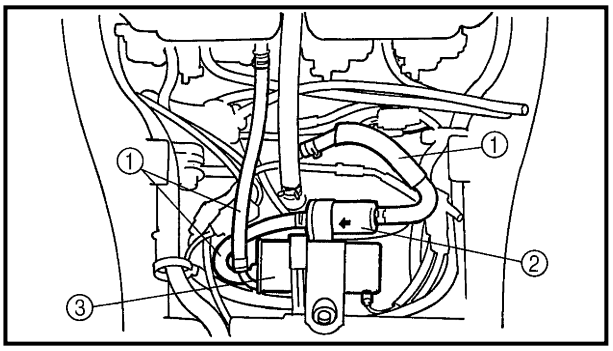


2. Check:
 • carburetor joint ①
 Cracks/damage → Replace.
 Refer to “CARBURETORS” in chapter 6.
3. Install:
 • carburetor assembly
 Refer to “CARBURETORS” in chapter 6.

EB303181
CHECKING THE FUEL HOSES AND FUEL FILTER

The following procedure applies to all of the fuel hoses.

1. Remove:
 • fuel tank
 Refer to “FUEL TANK”.



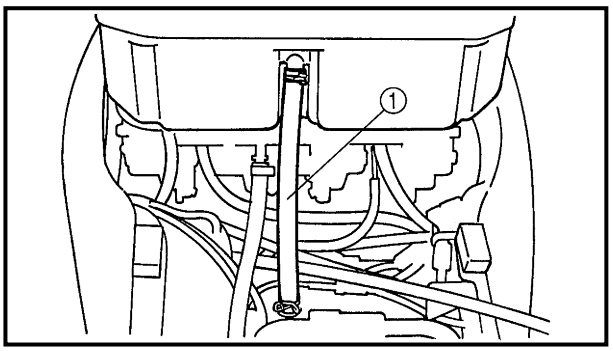
2. Check:
 • fuel hose ①
 Cracks/damage → Replace.
 • fuel filter ②
 Contaminants/damage → Replace.

NOTE:
- Drain and flush the fuel tank if abrasive damage to any components of the fuel line is evident.
- The arrow mark on the fuel filter must point towards the fuel pump ③ as shown.

3. Install:
 • fuel tank
 Refer to “FUEL TANK”.

EB303190
CHECKING THE CRANKCASE BREATHER HOSE

1. Remove:
 • fuel tank
 Refer to “FUEL TANK”.

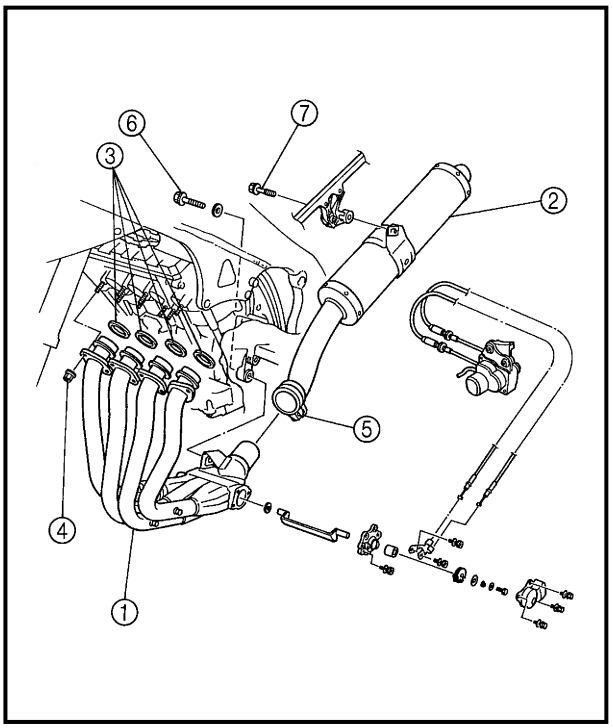


2. Check:
 • crankcase breather hose ①
 Cracks/damage → Replace.
 Loose connection → Connect properly.

CAUTION:

Make sure that the crankcase breather hose is routed correctly.

3. Install:
 • fuel tank
 Refer to "FUEL TANK".



EB303200

CHECKING THE EXHAUST SYSTEM

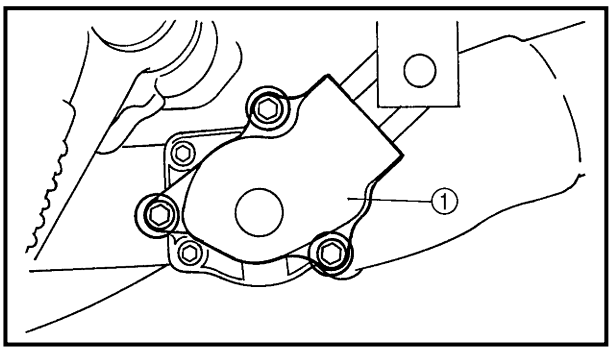
The following procedure applies to all of the exhaust pipes and gaskets.

1. Remove:
 • radiator assembly
 Refer to "RADIATOR" in chapter 5.
2. Check:
 • exhaust pipe ①
 • muffler ②
 Cracks/damage → Replace.
 • gasket ③
 Exhaust gas leaks → Replace.
3. Measure:
 • tightening torque



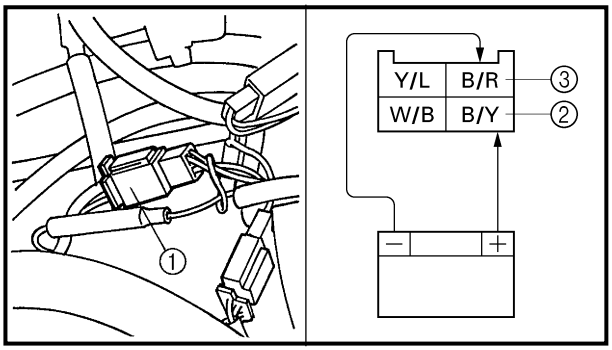
Exhaust pipe nut ④
20 Nm (2.0 m • kg)
Muffler clamp bolt ⑤
20 Nm (2.0 m • kg)
Exhaust pipe bolt ⑥
20 Nm (2.0 m • kg)
Muffler bolt ⑦
38 Nm (3.8 m • kg)

4. Install:
 • radiator assembly
 Refer to "RADIATOR" in chapter 5.



EB303210
ADJUSTING THE EXUP CABLES

1. Remove:
 • fuel tank
 • bottom cowling
 Refer to "FUEL TANK" and "COWLINGS".
2. Remove:
 • EXUP valve pulley cover ①



3. Check:
 • EXUP system operation

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a. Disconnect the EXUP servomotor coupler ①.

b. Connect the battery to the EXUP servomotor coupler and check if the servomotor operates properly.

Battery positive lead → black/yellow ②
Battery negative lead → black/red ③

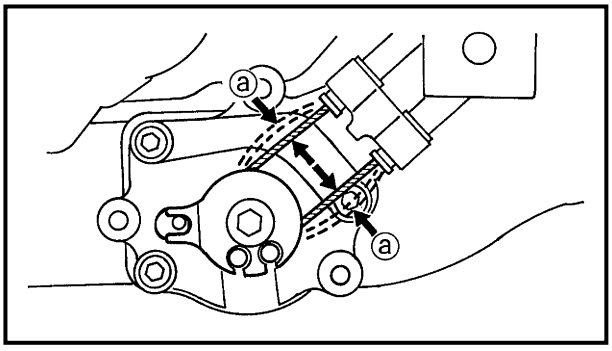
CAUTION:

To avoid damaging the servomotor, do not leave the battery connected to it for more than a few seconds.

c. Check that the EXUP valve operates properly.

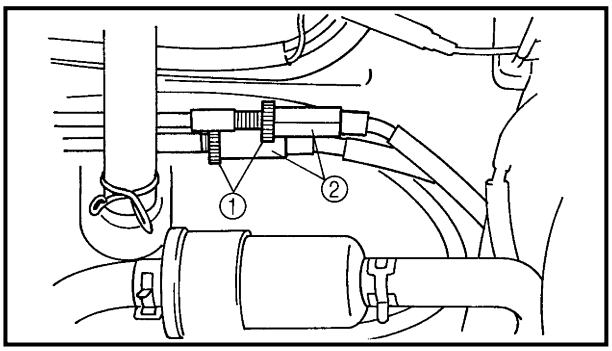
d. Connect the EXUP servomotor coupler.

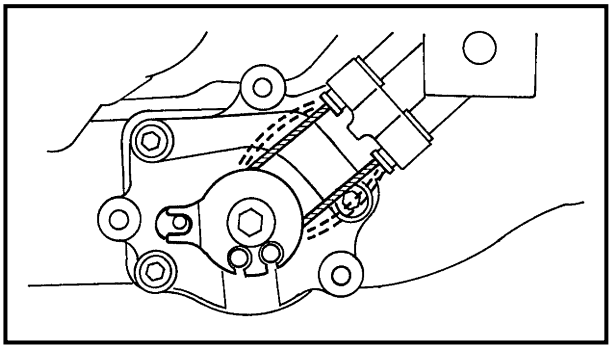
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4. Measure:
 • EXUP cable free play ⓐ

Max. EXUP cable free play (at the EXUP valve pulley)
1.5 mm





5. Adjust:
 • EXUP cable free play

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 a. Loosen both locknuts ①.
 b. Insert a 4-mm long pin through the notch in the EXUP valve pulley and into the hole in the EXUP valve cover.
 c. Turn both adjusting bolts ② counterclockwise until there is no EXUP cable free play.
 d. Turn both adjusting bolts 1/2 of a turn clockwise.
 e. Tighten both locknuts and then remove the pin.

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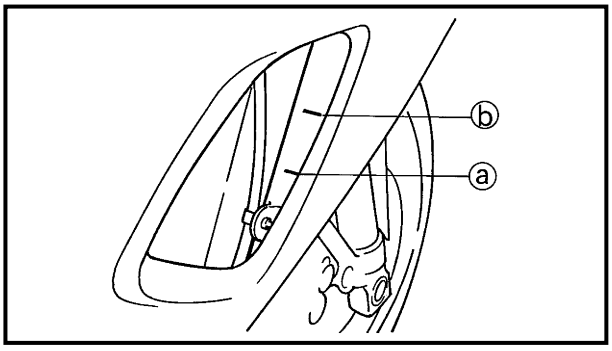
6. Install:
 • EXUP valve pulley cover

10 Nm (1.0 m · kg)

7. Install:
 • bottom cowling
 • fuel tank

 Refer to “COWLINGS” and “FUEL TANK”.

EB303220
CHECKING THE COOLANT LEVEL



1. Stand the motorcycle on a level surface.

NOTE:
- Place the motorcycle on a suitable stand.
- Make sure that the motorcycle is upright.

2. Check:
 • coolant level

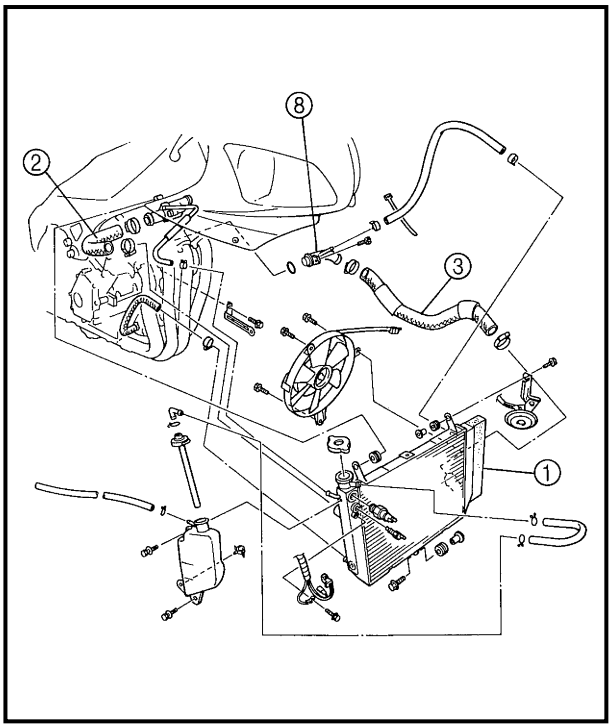
 The coolant level should be between the minimum level mark ⓐ and maximum level mark ⓑ.

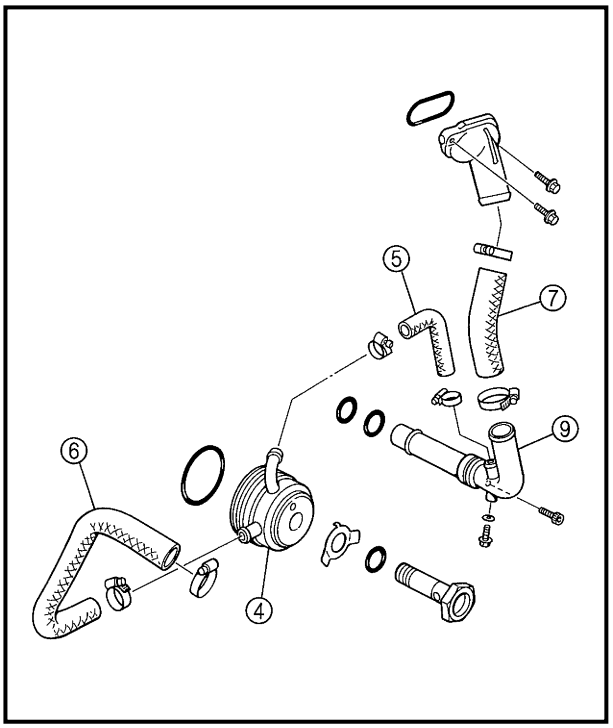
 Below the minimum level mark → Add the recommended coolant to the proper level.

CAUTION:
- **Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant, check and if necessary, correct the antifreeze concentration of the coolant.**
- **Use only distilled water. However, soft water may be used if distilled water is not available.**

3. Start the engine, warm it up for several minutes, and then turn it off.
4. Check:
 • coolant level

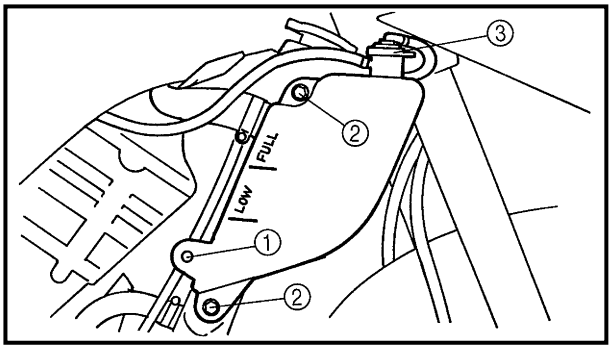
NOTE:
Before checking the coolant level, wait a few minutes until the coolant has settled.

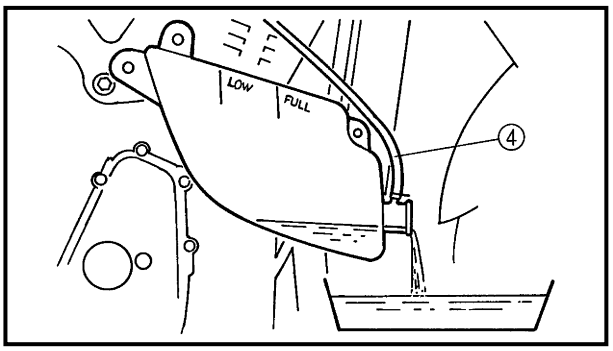




EB303230
CHECKING THE COOLING SYSTEM

1. Remove:
 • bottom cowling
 • side cowlings
 Refer to “COWLINGS”.
2. Check:
 • radiator ①
 • radiator inlet hose ②
 • radiator outlet hose ③
 • oil cooler ④
 • oil cooler inlet hose ⑤
 • oil cooler outlet hose ⑥
 • water jacket joint inlet hose ⑦
 • water pump inlet pipe ⑧
 • water pump outlet pipe ⑨
 Cracks/damage → Replace.
 Refer to “COOLING SYSTEM” in chapter 5.
3. Install:
 • side cowlings
 • bottom cowling
 Refer to “COWLINGS”.



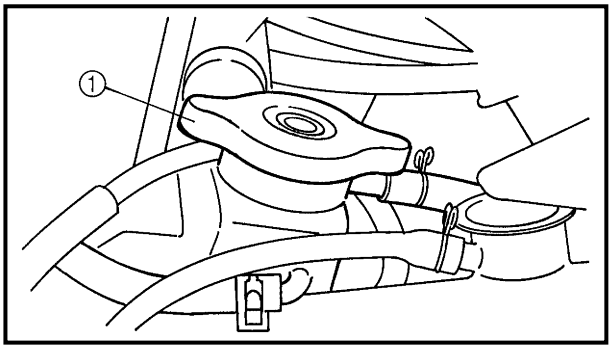


EB303240
CHANGING THE COOLANT

1. Remove:
 • bottom cowling
 • right side cowling
 Refer to “COWLINGS”.
2. Disengage:
 • clutch cable holder ①
 (from the coolant reservoir)
3. Remove:
 • coolant reservoir bolts ②
 • coolant reservoir cap ③

NOTE:
When draining the coolant from the coolant reservoir, be sure to tilt the reservoir so that coolant cannot flow through the coolant reservoir breather hose ④.

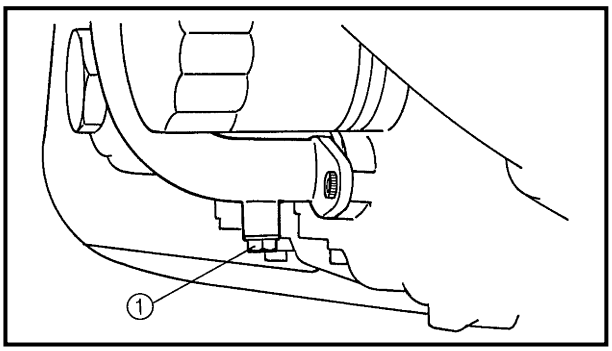
4. Drain:
 • coolant
 (from the coolant reservoir)
5. Install:
 • coolant reservoir bolts
6. Engage:
 • clutch cable holder



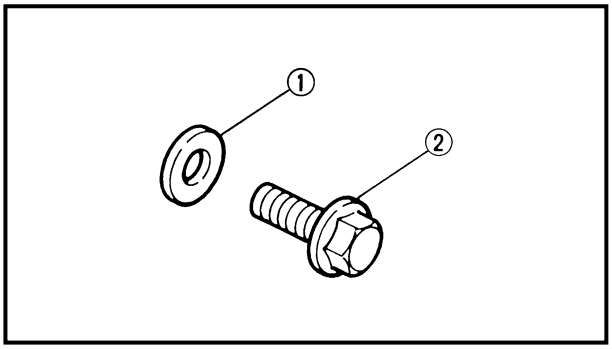
7. Remove:
 • radiator cap ①

⚠ WARNING

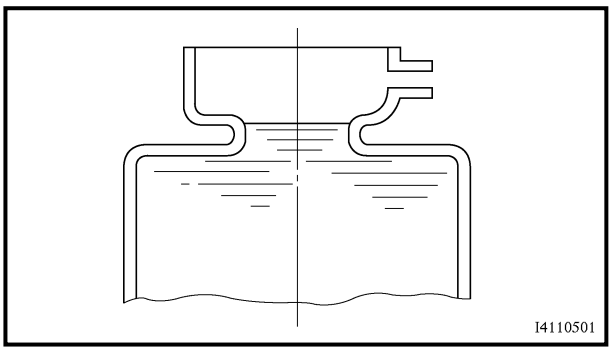
A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows:
Place a thick rag or a towel over the radiator cap and slowly turn the radiator cap counterclockwise toward the detent to allow any residual pressure to escape. When the hissing sound has stopped, turn the radiator cap counterclockwise while pressing down on it and then remove it.



8. Remove:
 • coolant drain bolt ①
 (along with the copper washer)
9. Drain:
 • coolant



10. Check:
 • copper washer ①
 • coolant drain bolt ②
 Damage → Replace.
11. Install:
 • coolant drain bolt **7 Nm (0.7 m · kg)**



12. Fill:
 • cooling system
 (with the specified amount of the recommended coolant)

Recommended antifreeze
High-quality ethylene glycol antifreeze containing corrosion inhibitors for aluminum engines
Mixing ratio
1:1 (antifreeze:water)
Quantity
Total amount
2.75 L (2.42 Imp qt)
Coolant reservoir capacity
0.45 L (0.4 Imp qt)

Handling notes for coolant

Coolant is potentially harmful and should be handled with special care.

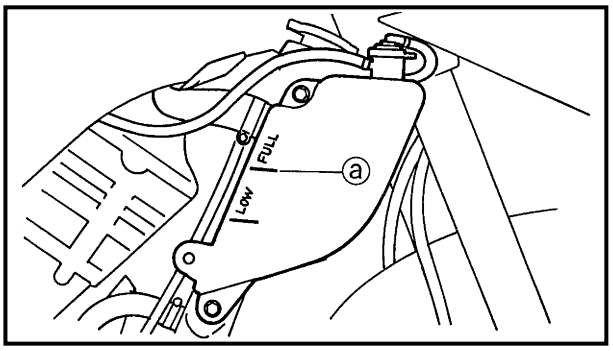
⚠ WARNING

- **If coolant splashes in your eyes, thoroughly wash them with water and consult a doctor.**
- **If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.**
- **If coolant is swallowed, induce vomiting and get immediate medical attention.**

CAUTION:

- **Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant, check, and if necessary, correct the antifreeze concentration of the coolant.**
- **Use only distilled water. However, soft water may be used if distilled water is not available.**
- **If coolant comes into contact with painted surfaces, immediately wash them with water.**
- **Do not mix different types of antifreeze.**

13. Install:
 - radiator cap

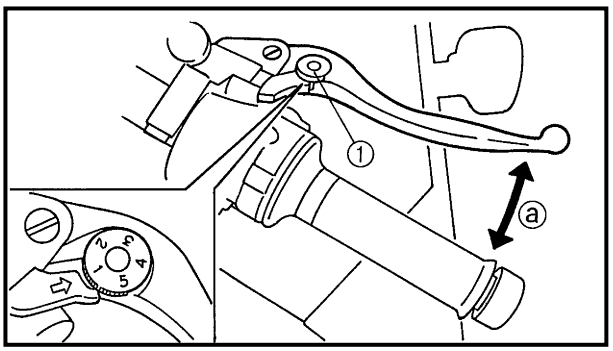


14. Fill:
 - coolant reservoir
 (with the recommended coolant to the maximum level mark ⓐ)
15. Install:
 - coolant reservoir cap
16. Start the engine, warm it up for several minutes, and then turn it off.
17. Check:
 - coolant level
 Refer to "CHECKING THE COOLANT LEVEL".

NOTE:

Before checking the coolant level, wait a few minutes until the coolant has settled.

18. Install:
 - right side cowling
 - bottom cowling
 Refer to "COWLINGS".



EB304001
CHASSIS

ADJUSTING THE FRONT BRAKE

1. Adjust:
 • brake lever position
 (distance ⓐ from the throttle grip to the brake lever)

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a. While pushing the brake lever forward, turn the adjusting dial ① until the brake lever is in the desired position.

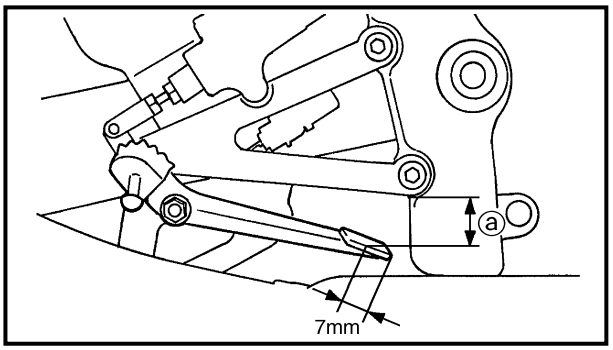
NOTE:
Be sure to align the setting on the adjusting dial with the arrow mark ② on the brake lever holder.

Position #1	**Distance ⓐ is the largest.**
Position #5	**Distance ⓐ is the smallest.**

⚠ WARNING

After adjusting the brake lever position, make sure that the pin on the brake lever holder is firmly inserted in the hole in the adjusting dial.

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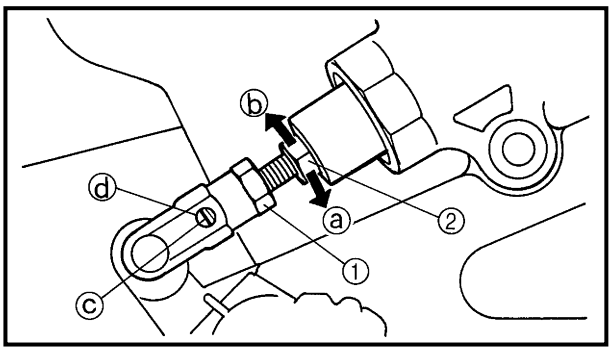


EB304010
ADJUSTING THE REAR BRAKE

1. Measure:
 • brake pedal position
 (distance ⓐ from the top of the brake pedal to the bottom of the rider footrest bracket)
 Out of specification → Adjust.



Brake pedal position (from the top of the brake pedal to the bottom of the rider footrest bracket)
35 ~ 40 mm



2. Adjust:
 • brake pedal position

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a. Loosen the locknut ①.

b. Turn the adjusting bolt ② in direction ⓐ or ⓑ until the specified brake pedal position is obtained.

Direction ⓐ	**Brake pedal is raised.**
Direction ⓑ	**Brake pedal is lowered.**

⚠ WARNING

After adjusting the brake pedal position, check that the end of the adjusting bolt ⓒ is visible through the hole ⓓ.

c. Tighten the locknut ① to specification.

	**Locknut** **16 Nm (1.6 m • kg)**

⚠ WARNING

A soft or spongy feeling in the brake pedal can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system. Air in the brake system will considerably reduce braking performance and could result in loss of control and possibly an accident. Therefore, check and, if necessary, bleed the brake system.

CAUTION:

After adjusting the brake pedal position, make sure that there is no brake drag.

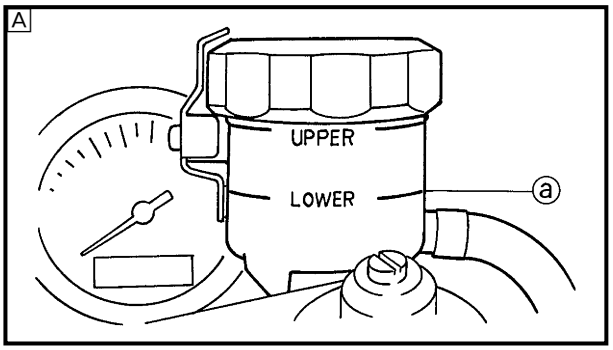
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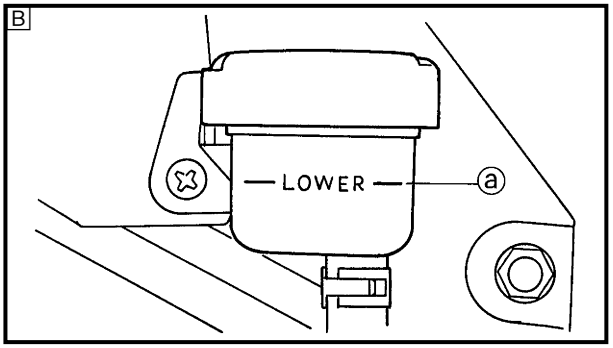
3. Adjust:
 • rear brake light switch
 Refer to "ADJUSTING THE REAR BRAKE LIGHT SWITCH".

EB304020
CHECKING THE BRAKE FLUID LEVEL

1. Stand the motorcycle on a level surface.

NOTE:
- Place the motorcycle on a suitable stand.
- Make sure that the motorcycle is upright.





2. Check:
 - brake fluid level
 Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.

	Recommended brake fluid **DOT 4**

A Front brake
B Rear brake

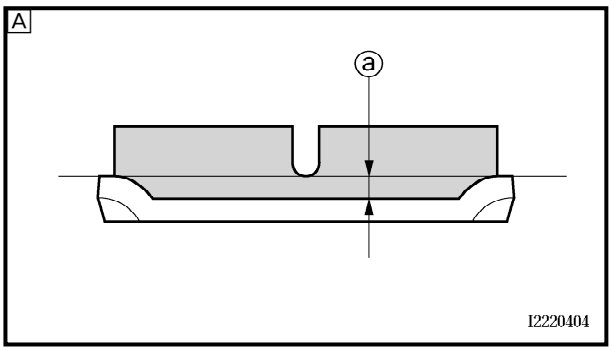
⚠ WARNING

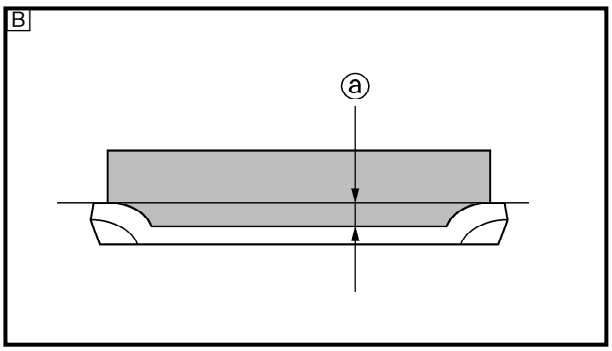
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

CAUTION:

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

NOTE:
In order to ensure a correct reading of the brake fluid level, make sure that the top of the brake fluid reservoir is horizontal.





EB304032
CHECKING THE BRAKE PADS

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:
 - front brake pad
 - rear brake pad

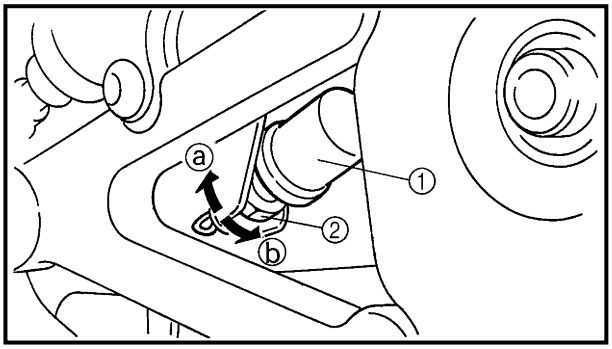
 Brake pad wear limit ⓐ
 Wear limit reached → Replace the brake pads as a set.
 Refer to "FRONT AND REAR BRAKES" in chapter 7.

	Brake pad wear limit 0.5 mm

A Front brake
B Rear brake

EB304050
ADJUSTING THE REAR BRAKE LIGHT SWITCH

NOTE:
- The rear brake light switch is operated by movement of the brake pedal.
- The rear brake light switch is properly adjusted when the brake light comes on just before the braking effect starts.



1. Check:
 - rear brake light operation timing

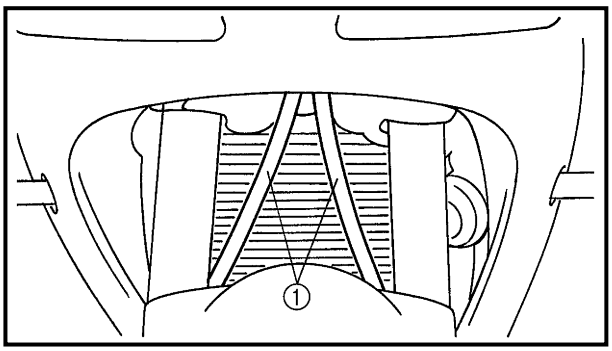
 Incorrect → Adjust.
2. Adjust:
 - rear brake light operation timing

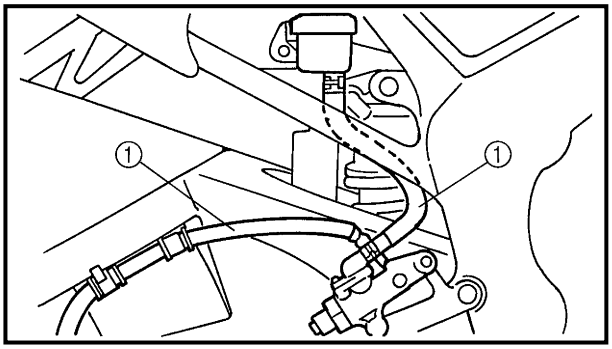
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a. Hold the main body ① of the rear brake light switch so that it does not rotate and turn the adjusting nut ② in direction ⓐ or ⓑ until the rear brake light comes on at the proper time.

Direction ⓐ	**Brake light comes on sooner.**
Direction ⓑ	**Brake light comes on later.**

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EB304062
CHECKING THE BRAKE HOSES

The following procedure applies to all of the brake hoses and brake hose clamps.

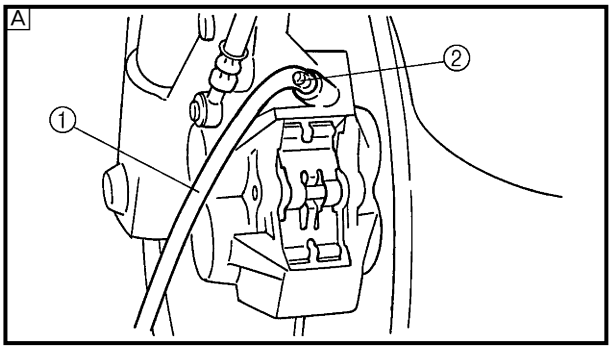
1. Check:
 - brake hose ①
 Cracks/damage/wear → Replace.
2. Check:
 - brake hose clamp
 Loose → Tighten the clamp bolt.
3. Hold the motorcycle upright and apply the brake several times.
4. Check:
 - brake hose
 Brake fluid leakage → Replace the damaged hose.
 Refer to "FRONT AND REAR BRAKES" in chapter 7.

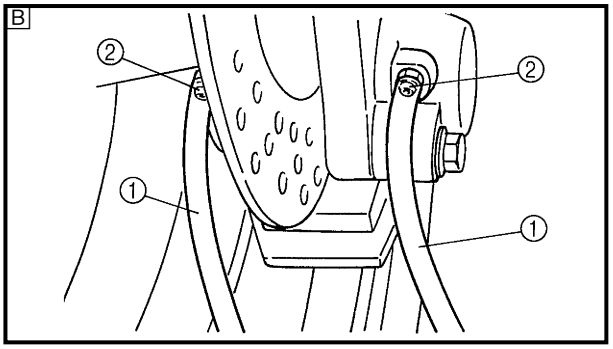
EB304072
BLEEDING THE HYDRAULIC BRAKE SYSTEM

⚠ WARNING

Bleed the hydraulic brake system whenever:
- **the brake system was disassembled,**
- **a brake hose was loosened, disconnected or replaced,**
- **the brake fluid level is very low,**
- **brake operation is faulty.**

NOTE:
- Be careful not to spill any brake fluid or allow the brake fluid reservoir to overflow.
- When bleeding the hydraulic brake system, make sure that there is always enough brake fluid before applying the brake. Ignoring this precaution could allow air to enter the hydraulic brake system, considerably lengthening the bleeding procedure.
- If bleeding is difficult, it may be necessary to let the brake fluid settle for a few hours. Repeat the bleeding procedure when the tiny bubbles in the hose have disappeared.





5. Bleed:
 • hydraulic brake system

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a. Fill the brake fluid reservoir to the proper level with the recommended brake fluid.

b. Install the brake fluid reservoir diaphragm.

c. Connect a clear plastic hose ① tightly to the bleed screw ②.
 A Front brake
 B Rear brake

d. Place the other end of the hose into a container.

e. Slowly apply the brake several times.

f. Fully squeeze the brake lever or fully depress the brake pedal and hold it in position.

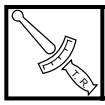
g. Loosen the bleed screw.

NOTE:
Loosening the bleed screw will release the pressure and cause the brake lever to contact the throttle grip or the brake pedal to fully extend.

h. Tighten the bleed screw and then release the brake lever or brake pedal.

i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the brake fluid in the plastic hose.

j. Tighten the bleed screw to specification.

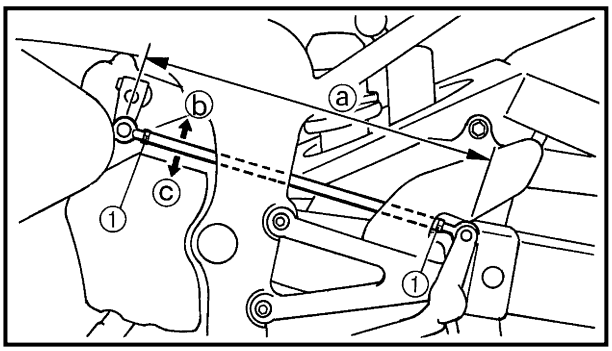
	**Bleed screw** **6 Nm (0.6 m • kg)**

k. Fill the brake fluid reservoir to the proper level with the recommended brake fluid.
 Refer to “CHECKING THE BRAKE FLUID LEVEL”.

⚠ WARNING

After bleeding the hydraulic brake system, check the brake operation.

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EB304081
ADJUSTING THE SHIFT PEDAL

NOTE:
The shift pedal position is determined by the installed shift rod length ⓐ.

1. Measure:
 • installed shift rod length ⓐ
 Incorrect → Adjust.

	Installed shift rod length 305 mm

2. Adjust:
 • installed shift rod length ⓐ

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a. Loosen both locknuts ①.

b. Turn the shift rod ② in direction ⓑ or ⓒ to obtain the correct shift pedal position.

Direction ⓑ	**Installed shift rod length increases.**
Direction ⓒ	**Installed shift rod length decreases.**

c. Tighten both locknuts.

d. Make sure that the installed shift rod length is within specification.

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EB304092
ADJUSTING THE DRIVE CHAIN SLACK

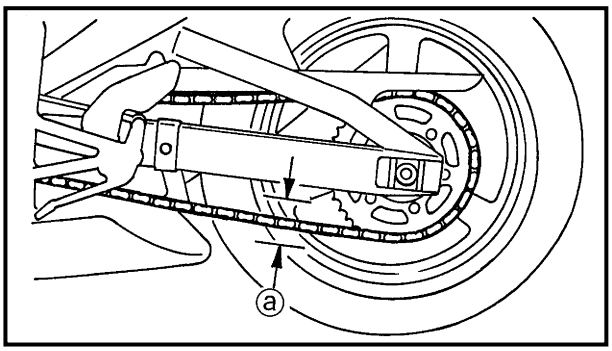
NOTE:
The drive chain slack must be checked at the tightest point on the chain.

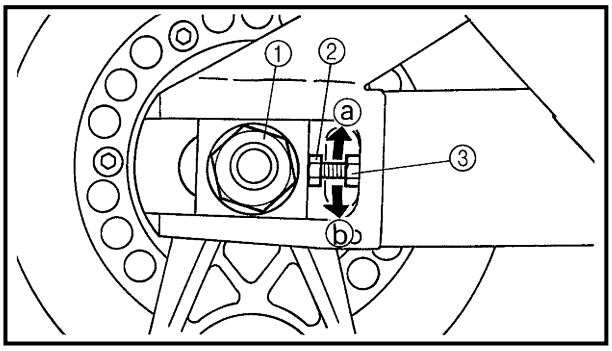
CAUTION:
A drive chain that is too tight will overload the engine and other vital parts, and one that is too loose can skip and damage the swingarm or cause an accident. Therefore, keep the drive chain slack within the specified limits.

1. Stand the motorcycle on a level surface.

⚠ WARNING
Securely support the motorcycle so that there is no danger of it falling over.

NOTE:
Place the motorcycle on a suitable stand so that the rear wheel is elevated.





2. Rotate the rear wheel several times and check the drive chain to locate its tightest point.
3. Measure:
 • drive chain slack ⓐ
 Out of specification → Adjust.

	Drive chain slack **40 ~ 50 mm**

4. Adjust:
 • drive chain slack

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a. Loosen the wheel axle nut ①.

b. Loosen both locknuts ②.

c. Turn both adjusting bolts ③ in direction ⓐ or ⓑ until the specified drive chain slack is obtained.

Direction ⓐ	**Drive chain slack is reduced.**
Direction ⓑ	**Drive chain slack is increased.**

NOTE:
To maintain the proper wheel alignment, adjust both sides evenly.

d. Tighten both locknuts to specification.

	Locknut **16 Nm (1.6 m • kg)**

e. Tighten the wheel axle nut to specification.

	Wheel axle nut **150 Nm (15.0 m • kg)**

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EB304100
LUBRICATING THE DRIVE CHAIN

The drive chain consists of many interacting parts. If the drive chain is not maintained properly, it will wear out rapidly. Therefore, the drive chain should be serviced, especially when the motorcycle is used in dusty areas. This motorcycle has a drive chain with small rubber O-rings between each side plate. Steam cleaning, high-pressure washing, certain solvents, and the use of a coarse brush can damage these O-rings. Therefore, use only kerosine to clean the drive chain. Wipe the drive chain dry and thoroughly lubricate it with engine oil or chain lubricant that is suitable for O-ring chains. Do not use any other lubricants on the drive chain since they may contain solvents that could damage the O-rings.

Recommended lubricant
Engine oil or chain lubricant suitable for O-ring chains

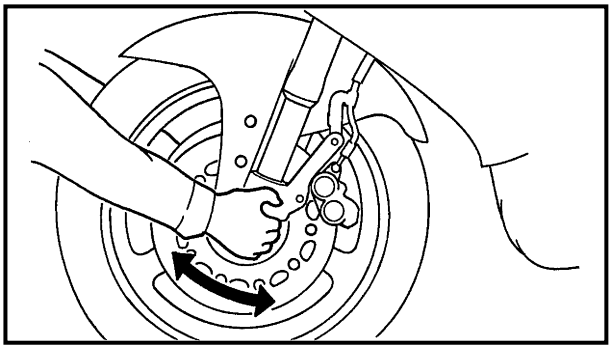
EB304130
CHECKING AND ADJUSTING THE STEERING HEAD

1. Stand the motorcycle on a level surface.

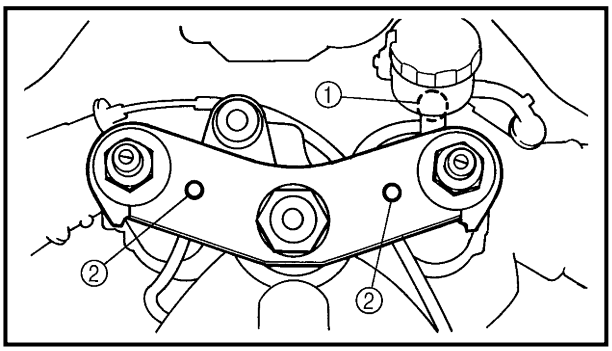
⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

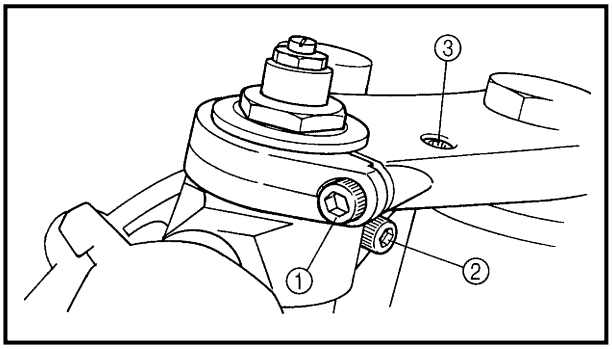
NOTE:
Place the motorcycle on a suitable stand so that the front wheel is elevated.



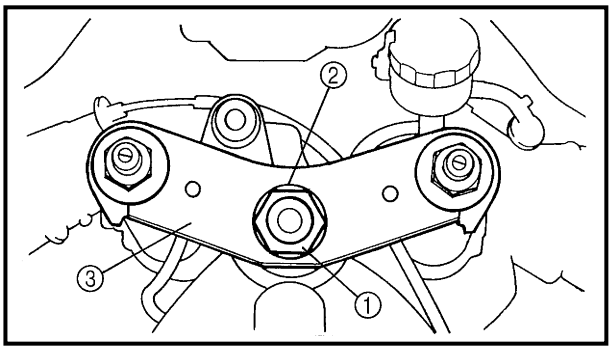
2. Check:
 - steering head
 Grasp the bottom of the front fork legs and gently rock the front fork.
 Looseness/binding → Adjust the steering head.



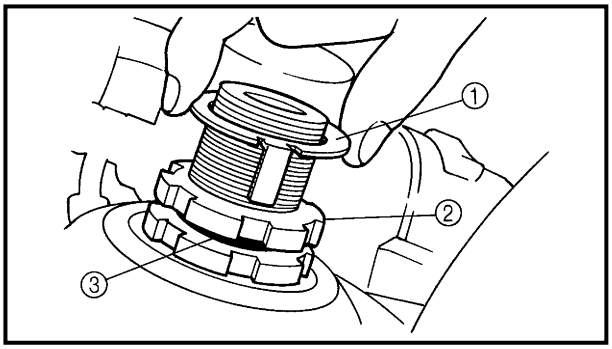
3. Remove:
 • front brake fluid reservoir ①
 • plastic caps ②

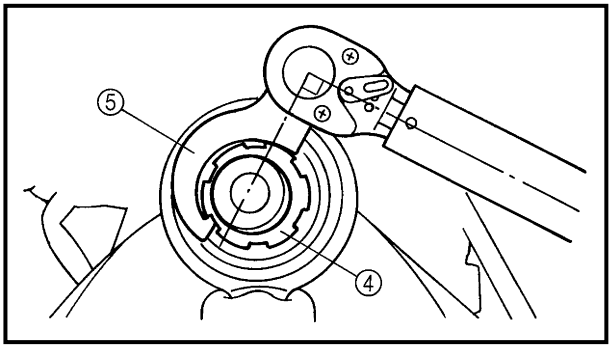


4. Loosen:
 • upper bracket pinch bolts ①
 • handlebar pinch bolts ②
5. Remove:
 • upper bracket bolts ③
 • handlebars
 (from the upper bracket)



6. Remove:
 • steering stem nut ①
 • washer ②
 • upper bracket ③





7. Adjust:
 • steering head

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a. Remove the lock washer ①, the upper ring nut ②, and the rubber washer ③.
b. Loosen the lower ring nut ④ and then tighten it to specification with a ring nut wrench ⑤.

NOTE:
Set the torque wrench at a right angle to the steering nut wrench.

	**Steering nut wrench** **90890-01403**
	**Lower ring nut (initial tightening torque)** **28 Nm (2.8 m • kg)**

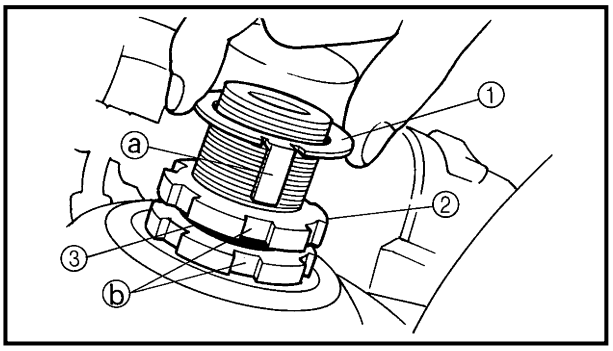
c. Loosen the lower ring nut completely, then tighten it to specification.

⚠ WARNING

Do not overtighten the lower ring nut.

	Lower ring nut (final tightening torque) **9 Nm (0.9 m • kg)**

d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.
Refer to "STEERING HEAD" in chapter 7.



e. Install the rubber washer ③.

f. Install the upper ring nut ②.

g. Finger tighten the upper ring nut ②, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.

h. Install the lock washer ①.

NOTE:

Make sure that the lock washer tabs ⓐ sit correctly in the ring nut slots ⓑ.

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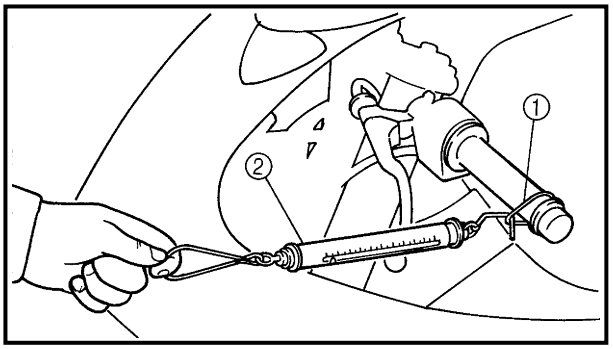
8. Install:
 - steering stem nut — **115 Nm (11.5 m · kg)**
 - upper bracket bolt — **13 Nm (1.3 m · kg)**
 - handlebar pinch bolt — **17 Nm (1.7 m · kg)**
 - upper bracket pinch bolt — **26 Nm (2.6 m · kg)**

9. Measure:
 - steering head tension
 (with the motorcycle still on the stand)

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NOTE:

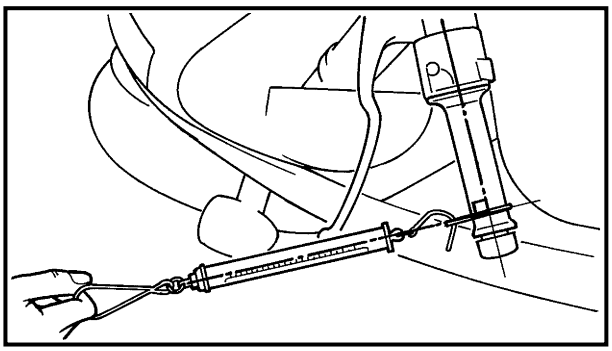
Make sure that all of the cables and wires are properly routed.



a. Point the front wheel straight ahead.

b. Install a plastic locking tie ① loosely around the end of the handlebar as shown.

c. Hook a spring gauge ② onto the plastic locking tie.



d. Hold the spring gauge at a 45° angle from the handlebar, pull the spring gauge, and record the measurement when the handlebar starts to turn.

Steering head tension
200 ~ 500 g

e. Repeat the above procedure on the opposite handlebar.

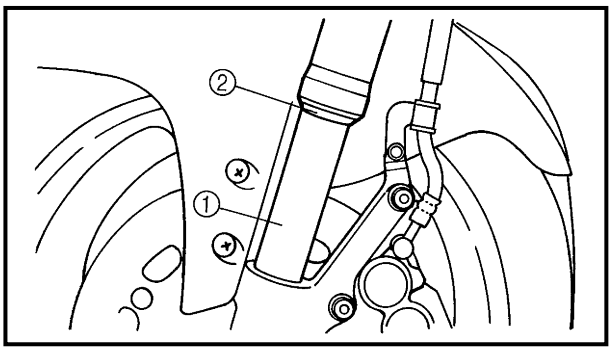
f. If the steering head tension is out of specification (both handlebars should be within specification), remove the upper bracket and loosen or tighten the upper ring nut.

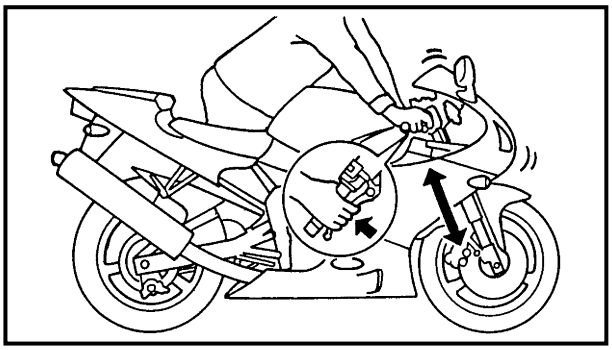
g. Reinstall the upper bracket and measure the steering head tension again as described above.

h. Repeat the above procedure until the steering head tension is within specification.

i. Grasp the bottom of the front fork legs and gently rock the front fork.
Looseness or binding → Adjust the steering head.

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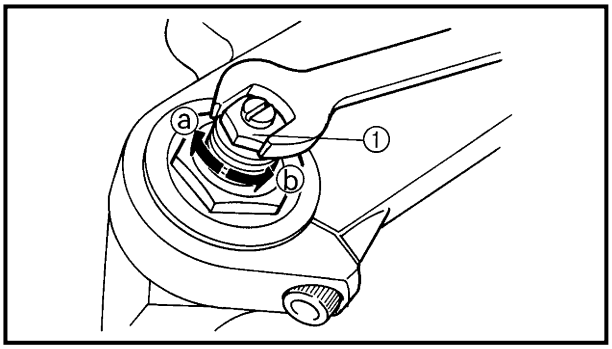
EB304141
CHECKING THE FRONT FORK

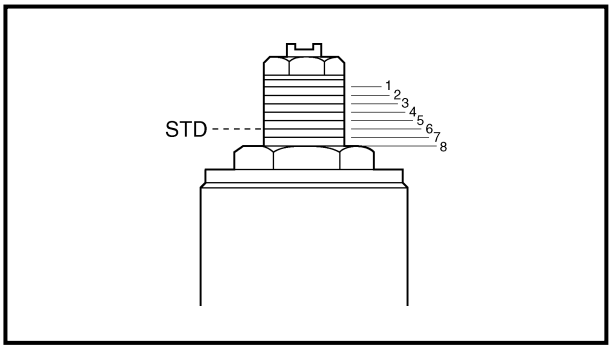
1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

2. Check:
 - inner tube ①
 Damage/scratches → Replace.
 - oil seal ②
 Oil leakage → Replace.
3. Hold the motorcycle upright and apply the front brake.
4. Check:
 - front fork operation
 Push down hard on the handlebars several times and check if the front fork rebounds smoothly.
 Rough movement → Repair.
 Refer to “FRONT FORK” in chapter 7.





EB304153
ADJUSTING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

⚠ WARNING

- **Always adjust both front fork legs evenly. Uneven adjustment can result in poor handling and loss of stability.**
- **Securely support the motorcycle so that there is no danger of it falling over.**

Spring preload

CAUTION:

- **Grooves are provided to indicate the adjustment position.**
- **Never go beyond the maximum or minimum adjustment positions.**

1. Adjust:
 - spring preload

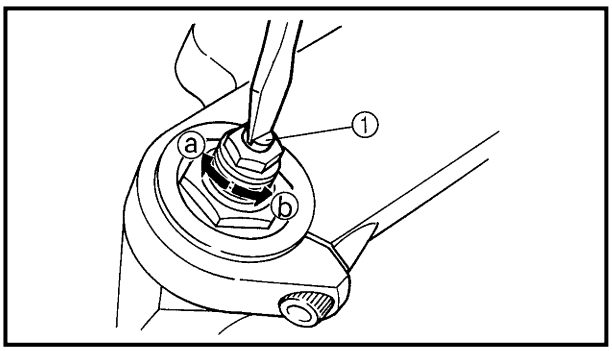
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a. Turn the adjusting bolt ① in direction ⓐ or ⓑ.

Direction ⓐ	**Spring preload is increased (suspension is harder).**
Direction ⓑ	**Spring preload is decreased (suspension is softer).**

Adjusting positions
Minimum: 8
Standard: 6
Maximum: 1

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Rebound damping

CAUTION:

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
 • rebound damping

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a. Turn the adjusting screw ① in direction ⓐ or ⓑ.

Direction ⓐ	**Rebound damping is increased (suspension is harder).**
Direction ⓑ	**Rebound damping is decreased (suspension is softer).**

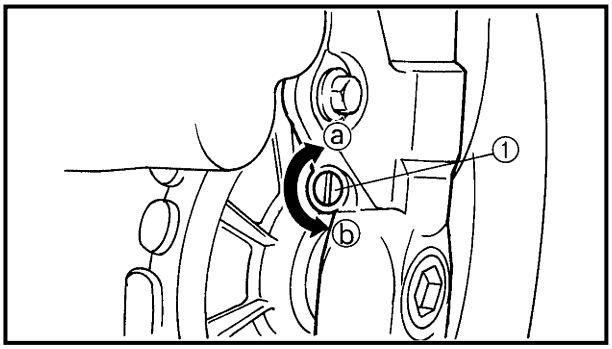
Adjusting positions
Minimum: 13 clicks out*
Standard: 5 clicks out*
Maximum: 1 clicks out*
*** from the fully turned-in position**

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Compression damping

CAUTION:

Never go beyond the maximum or minimum adjustment positions.



1. Adjust:
 • compression damping

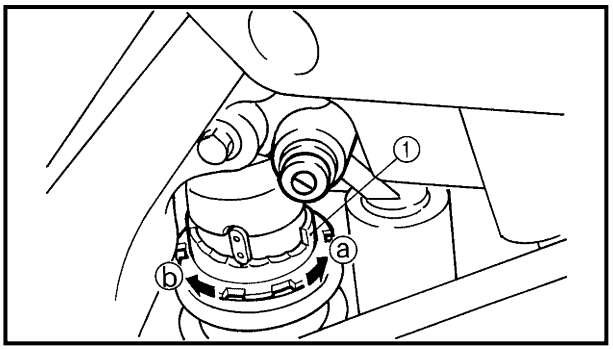
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a. Turn the adjusting screw ① in direction ⓐ or ⓑ.

Direction ⓐ	**Compression damping is increased (suspension is harder).**
Direction ⓑ	**Compression damping is decreased (suspension is softer).**

Adjusting positions
Minimum: 11 clicks out*
Standard: 5 clicks out*
Maximum: 1 clicks out*
*** from the fully turned-in position**

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EB304162

ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

Spring preload

CAUTION:

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
 • spring preload

NOTE:
Adjust the spring preload with the special wrench and extension bar included in the owner's tool kit.

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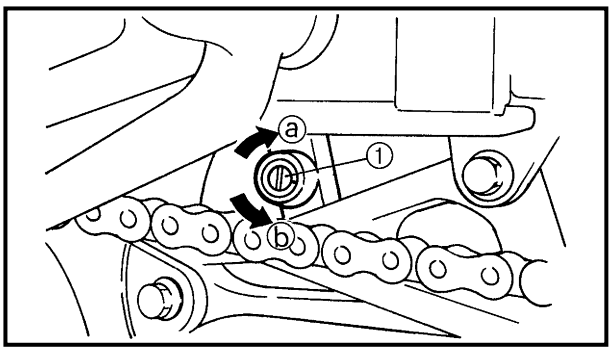
a. Turn the adjusting ring ① in direction ⓐ or ⓑ.

b. Align the desired position on the adjusting ring with the position indicator ②.

Direction ⓐ	**Spring preload is increased (suspension is harder).**
Direction ⓑ	**Spring preload is decreased (suspension is softer).**

Adjusting positions
Minimum: 1
Standard: 4
Maximum: 9

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Rebound damping

CAUTION:

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
 • rebound damping

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a. Turn the adjusting screw ① in direction ⓐ or ⓑ.

Direction ⓐ	**Rebound damping is increased (suspension is harder).**
Direction ⓑ	**Rebound damping is decreased (suspension is softer).**

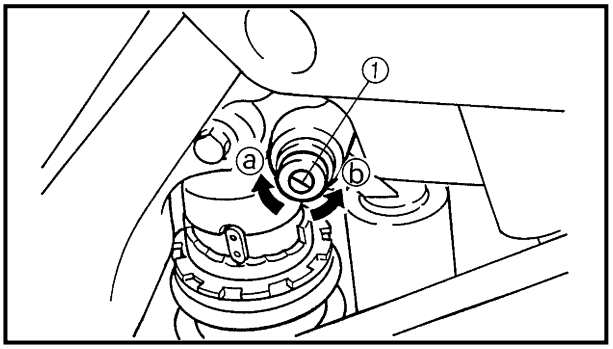
Adjusting positions
Minimum: 12 clicks out*
Standard: 6 clicks out*
Maximum: 1 clicks out*
*** from the fully turned-in position**

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Compression damping

CAUTION:

Never go beyond the maximum or minimum adjustment positions.



1. Adjust:
 • compression damping

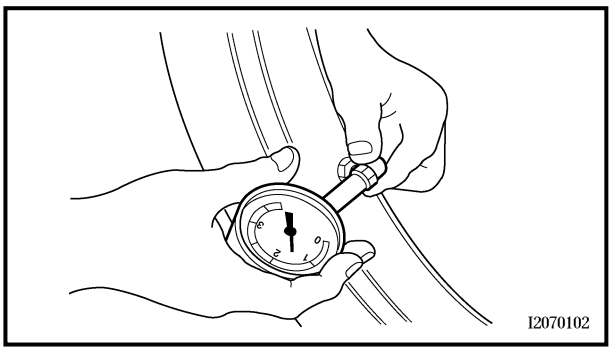
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a. Turn the adjusting screw ① in direction ⓐ or ⓑ.

Direction ⓐ	**Compression damping is increased (suspension is harder).**
Direction ⓑ	**Compression damping is decreased (suspension is softer).**

Adjusting positions
Minimum: 12 clicks out*
Standard: 8 clicks out*
Maximum: 1 clicks out*
*** from the fully turned-in position**

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EB304170
CHECKING THE TIRES

The following procedure applies to both of the tires.

1. Measure:
 • tire pressure
 Out of specification → Regulate.

⚠ WARNING

• The tire pressure should only be checked and regulated when the tire temperature equals the ambient air temperature.
• The tire pressure and the suspension must be adjusted according to the total weight (including cargo, rider, passenger and accessories) and the anticipated riding speed.
• Operation of an overloaded motorcycle could cause tire damage, an accident or an injury.

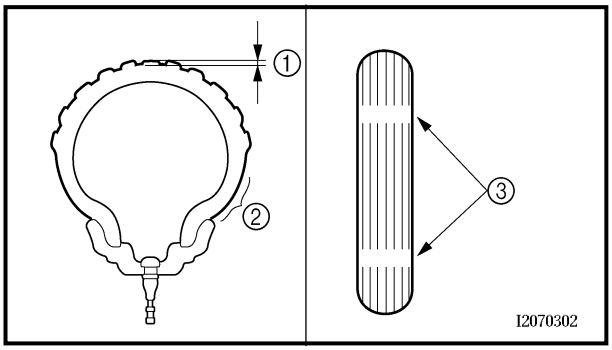
NEVER OVERLOAD THE MOTORCYCLE.

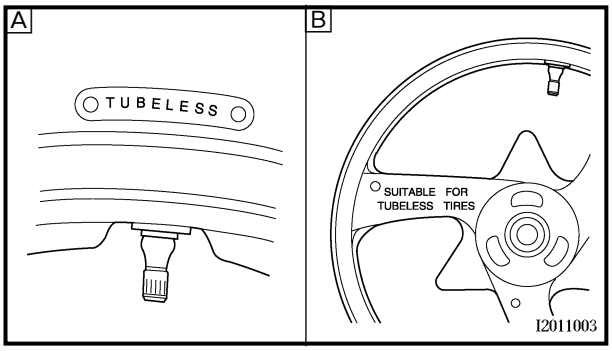
Basic weight (with oil and a full fuel tank)	**198 kg**	
Maximum load*	**197 kg**	
Cold tire pressure	**Front**	**Rear**
Up to 90 kg load*	**250 kPa (2.5 kgf/cm², 2.5 bar)**	**250 kPa (2.5 kgf/cm², 2.5 bar)**
90 kg ~ maximum load*	**250 kPa (2.5 kgf/cm², 2.5 bar)**	**290 kPa (2.9 kgf/cm², 2.9 bar)**
High-speed riding	**250 kPa (2.5 kgf/cm², 2.5 bar)**	**250 kPa (2.5 kgf/cm², 2.5 bar)**

* total of cargo, rider, passenger and accessories

⚠ WARNING

It is dangerous to ride with a worn-out tire. When the tire tread reaches the wear limit, replace the tire immediately.





2. Check:
 - tire surfaces
 Damage/wear → Replace the tire.

	Minimum tire tread depth 1.6 mm

① Tire tread depth
② Side wall
③ Wear indicator

⚠ WARNING

- **Do not use a tubeless tire on a wheel designed only for tube tires to avoid tire failure and personal injury from sudden deflation.**
- **When using a tube tire, be sure to install the correct tube.**
- **Always replace a new tube tire and a new tube as a set.**
- **To avoid pinching the tube, make sure that the wheel rim band and tube are centered in the wheel groove.**
- **Patching a punctured tube is not recommended. If it is absolutely necessary to do so, use great care and replace the tube as soon as possible with a good quality replacement.**

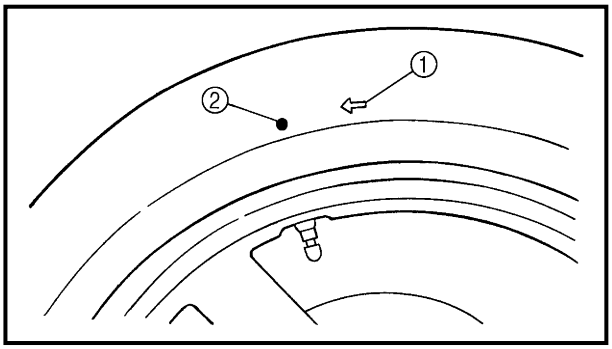
Ⓐ Tire Ⓑ Wheel

Tube wheel	**Tube tire only**
Tubeless wheel	**Tube or tubeless tire**

- **After extensive tests, the tires listed below have been approved by Yamaha Motor Co., Ltd. for this model. The front and rear tires should always be by the same manufacturer and of the same design. No guarantee concerning handling characteristics can be given if a tire combination other than one approved by Yamaha is used on this motorcycle.**

Front tire

Manufacturer	Size	Model
BRIDGESTONE	120/70 ZR17 (58W)	BT56F BT57F
METZELER	120/70 ZR17 (58W)	MEZ1 FRONT RACING
METZELER	120/70 ZR17 (58W)	MEZ3 FRONT
DUNLOP	120/70 ZR17 (58W)	D207FN
MICHELIN	120/70 ZR17 (58W)	TX15
MICHELIN	120/70 ZR17 (58W)	MACADAM 90XS
PIRELLI	120/70 ZR17 (58W)	MTR01
PIRELLI	120/70 ZR17 (58W)	MTR01 CORSA



Rear tire

Manufacturer	Size	Model
BRIDGESTONE	190/50 ZR17 (73W)	BT56R BT57R
METZELER	190/50 ZR17 (73W)	MEZ1 RACING
METZELER	190/50 ZR17 (73W)	MEZ3
DUNLOP	190/50 ZR17 (73W)	D207L
MICHELIN	190/50 ZR17 (73W)	TX25
MICHELIN	190/50 ZR17 (73W)	MACADAM 90X
PIRELLI	190/50 ZR17 (73W)	MTR02
PIRELLI	190/50 ZR17 (73W)	MTR02 CORSA

⚠ WARNING

After mounting a new tire, ride conservatively for a while to become accustomed to the "feel" of the new tire and to allow the tire to seat itself properly in the rim. Failure to do so could lead to an accident with possible injury to the rider or damage to the motorcycle.

NOTE:

For tires with a direction of rotation mark ①:
- Install the tire with the mark pointing in the direction of wheel rotation.
- Align the mark ② with the valve installation point.

EB304180

CHECKING THE WHEELS

The following procedure applies to both of the wheels.

1. Check:
 - wheel
 Damage/out-of-round → Replace.

⚠ WARNING

Never attempt to make any repairs to the wheel.

NOTE:

After a tire or wheel has been changed or replaced, always balance the wheel.

EB304200
CHECKING AND LUBRICATING THE CABLES

The following procedure applies to all of the cable sheaths and cables.

⚠ WARNING

Damaged cable sheaths may cause the cable to corrode and interfere with its movement. Replace damaged cable sheaths and cables as soon as possible.

1. Check:
 - cable sheath
 Damage → Replace.
2. Check:
 - cable operation
 Rough movement → Lubricate.

Recommended lubricant
Engine oil or a suitable cable lubricant

NOTE:
Hold the cable end upright and pour a few drops of lubricant into the cable sheath or use a suitable lubing device.

EB304210
LUBRICATING THE LEVERS AND PEDALS

Lubricate the pivoting point and metal-to-metal moving parts of the levers and pedals.

Recommended lubricant
Lithium soap base grease

EB304220
LUBRICATING THE SIDESTAND

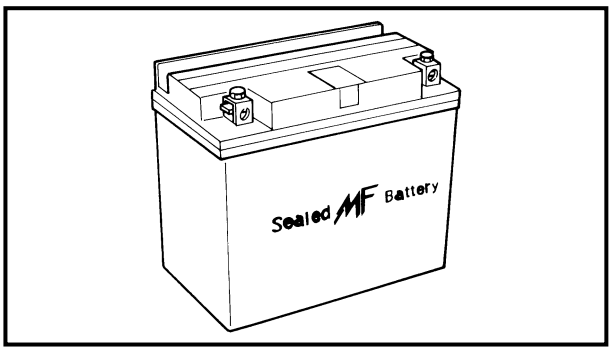
Lubricate the pivoting point and metal-to-metal moving parts of the sidestand.

Recommended lubricant
Lithium soap base grease

EB304240
LUBRICATING THE REAR SUSPENSION

Lubricate the pivoting point and metal-to-metal moving parts of the rear suspension.

Recommended lubricant
Lithium soap base grease



EB305020

ELECTRICAL SYSTEM

CHECKING AND CHARGING THE BATTERY

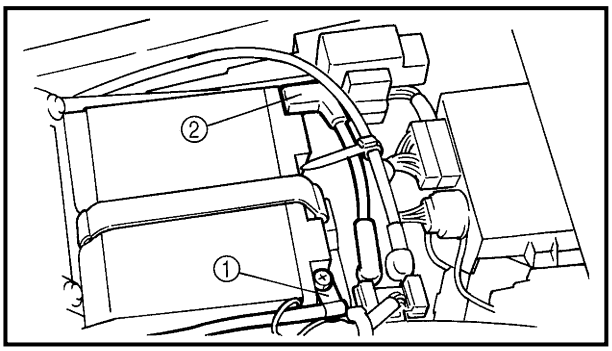
⚠ WARNING

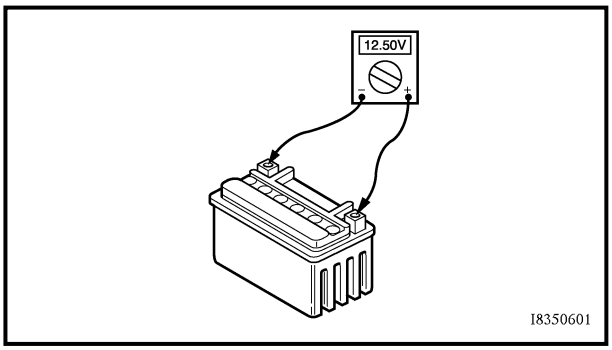
Batteries generate explosive hydrogen gas and contain electrolyte which is made of poisonous and highly caustic sulfuric acid.
Therefore, always follow these preventive measures:
- **Wear protective eye gear when handling or working near batteries.**
- **Charge batteries in a well-ventilated area.**
- **Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).**
- **DO NOT SMOKE when charging or handling batteries.**
- **KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.**
- **Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.**

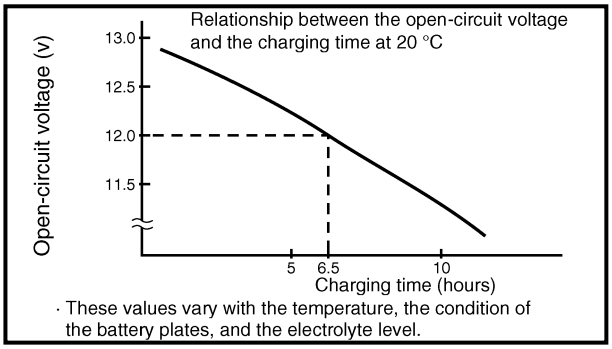
FIRST AID IN CASE OF BODILY CONTACT:
EXTERNAL
- **Skin – Wash with water.**
- **Eyes – Flush with water for 15 minutes and get immediate medical attention.**

INTERNAL
- **Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.**

CAUTION:
- **This is a sealed battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.**
- **Charging time, charging amperage and charging voltage for an MF battery are different from those of conventional batteries. The MF battery should be charged as explained in the charging method illustrations. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.**







NOTE:
Since MF batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

1. Remove:
 • rider seat
 Refer to "SEATS".
2. Disconnect:
 • battery leads
 (from the battery terminals)

CAUTION:
First, disconnect the negative lead ①, then the positive lead ②.

3. Remove:
 • battery

4. Measure:
 • battery charge

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a. Connect a digital voltmeter to the battery terminals.

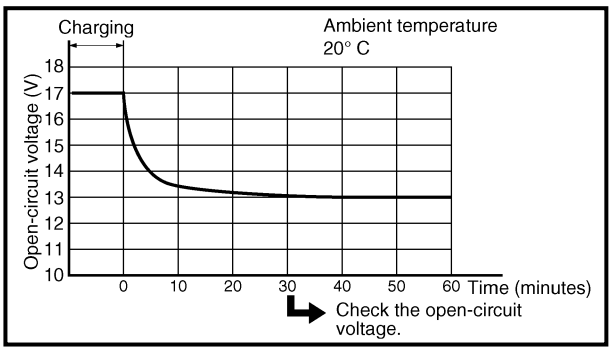
Tester positive probe → battery positive terminal
Tester negative probe → battery negative terminal

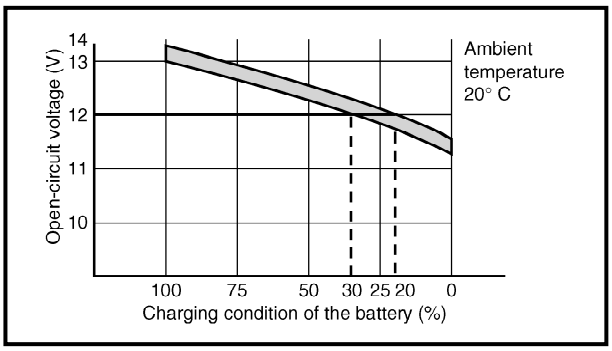
NOTE:
- The charge state of an MF battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive terminal is disconnected).
- No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.

b. Check the charge of the battery, as shown in the charts and the following example.

Example
Open-circuit voltage = 12.0 V
Charging time = 6.5 hours
Charge of the battery = 20 ~ 30%

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5. Charge:
 - battery
 (refer to the appropriate charging method illustration)

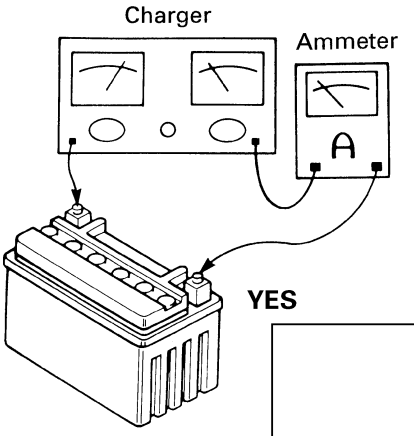
⚠ WARNING

Do not quick charge a battery.

CAUTION:

- **Never remove the MF battery sealing caps.**
- **Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.**
- **If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.**
- **When charging a battery, be sure to remove it from the motorcycle. (If charging has to be done with the battery mounted on the motorcycle, disconnect the negative lead from the battery terminal.)**
- **To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.**
- **Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.**
- **Make sure that the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.**
- **If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!**
- **As shown in the following illustration, the open-circuit voltage of an MF battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.**

Charging method using a variable-voltage charger



Measure the open-circuit voltage prior to charging.

NOTE:
Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.

Connect a charger and ammeter to the battery and start charging.

NOTE:
Set the charging voltage to 16 ~ 17 V. (If the charging voltage is lower, charging will be insufficient, if it is higher, the battery will be over-charged.)

Is the amperage higher than the standard charging amperage written on the battery?

YES

NO

Adjust the charging voltage to 20 ~ 25 V.

Monitor the amperage for 3 ~ 5 minutes. Is the standard charging amperage exceeded?

YES

NO

Adjust the voltage to obtain the standard charging amperage.

If the amperage does not exceed the standard charging amperage after 5 minutes, replace the battery.

Set the timer to the charging time determined by the open -circuit voltage.
Refer to "CHECKING AND CHARGING THE BATTERY."

If the required charging time exceeds 5 hours, it is advisable to check the charging amperage after 5 hours. If there is any change in the amperage, readjust the voltage to obtain the standard charging amperage.

Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.
12.8 V ➔ Charging is complete.
12.0~12.7 V ➔ Recharging is required.
Under 12.0 V ➔ Replace the battery.

Charging method using a constant-voltage charger

Measure the open-circuit voltage prior to charging.

NOTE:
Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.

Connect a charger and ammeter to the battery and start charging.

Is the amperage higher than the standard charging amperage written on the battery?

YES

Charge the battery until the charging voltage reaches 15 V.

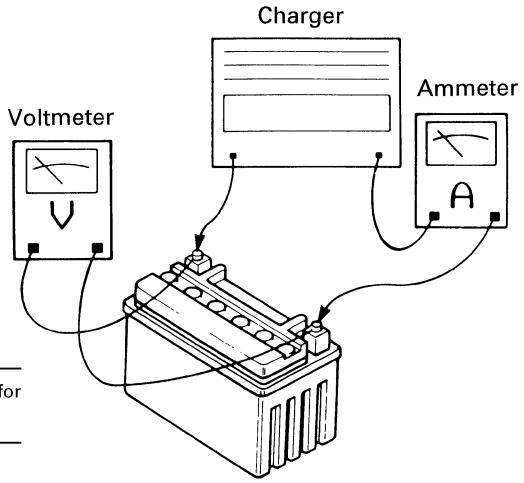
NOTE:
Set the charging time to a maximum of 20 hours.

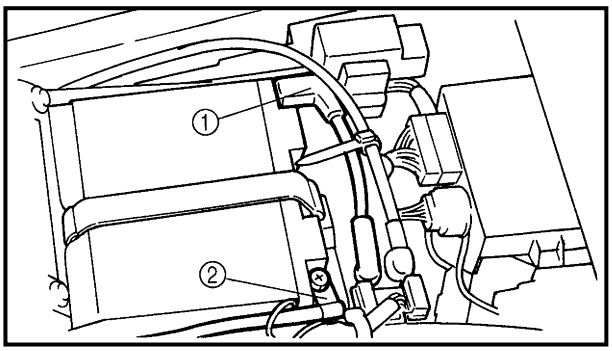
Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.
12.8 V ➔ Charging is complete.
12.0~12.7 V ➔ Recharging is required.
Under 12.0 V ➔ Replace the battery.

CAUTION:
Constant amperage chargers are not suitable for charging MF batteries.

NO

This type of battery charger cannot charge an MF battery. A variable-voltage charger is recommended.





6. Install:
 • battery
7. Connect:
 • battery leads
 (to the battery terminals)

CAUTION:

First, connect the positive lead ①, then the negative lead ②.

8. Check:
 • battery terminals
 Dirt → Clean with a wire brush.
 Loose connection → Connect properly.
9. Lubricate:
 • battery terminals

	Recommended lubricant **Dielectric grease**

10. Install:
 • rider seat
 Refer to "SEATS".

EB305040
CHECKING THE FUSES

The following procedure applies to all of the fuses.

CAUTION:

To avoid a short circuit, always set the main switch to "OFF" when checking or replacing a fuse.

1. Remove:
 • rider seat
 Refer to "SEATS".
2. Check:
 • continuity

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a. Connect the pocket tester to the fuse and check the continuity.

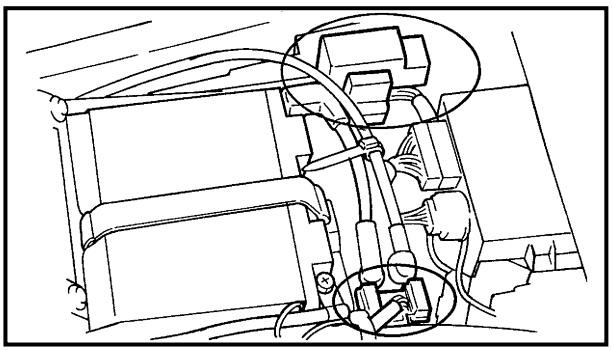
NOTE:

Set the pocket tester selector to "Ω × 1".

	Pocket tester **90890-03112**

b. If the pocket tester indicates "∞", replace the fuse.

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3. Replace:
 • blown fuse

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a. Set the main switch to "OFF".
b. Install a new fuse of the correct amperage.
c. Set the main switch to "ON" and verify if the electrical circuit is operational.
d. If the fuse immediately blows again, check the electrical circuit.

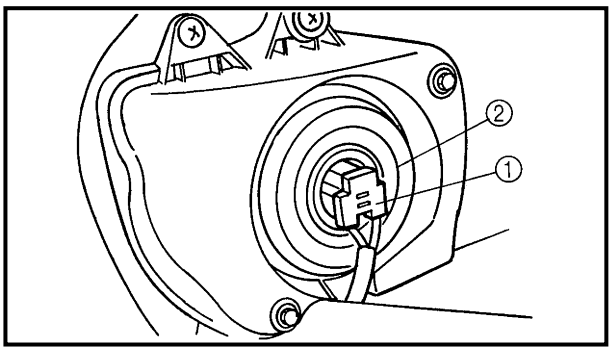
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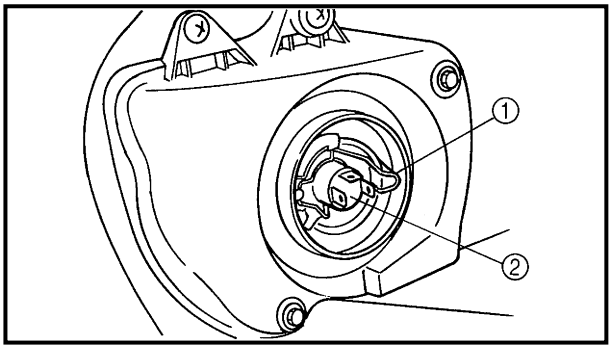
Item	Amperage	Q'ty
Main fuse	30 A	1
Headlight fuse	20 A	1
Signaling system fuse	20 A	1
Ignition fuse	15 A	1
Radiator fan motor fuse	7.5 A	1
Backup fuse (odometer)	7.5 A	1

⚠ WARNING

Never use a fuse with an amperage other than that specified. Improvising or using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, cause the lighting and ignition systems to malfunction and could possibly cause a fire.

4. Install:
 • rider seat
 Refer to "SEATS".





EB305051
REPLACING THE HEADLIGHT BULBS

The following procedure applies to both of the headlight bulbs.

1. Disconnect:
 - headlight coupler ①
 - headlight bulb holder cover ②
2. Detach:
 - headlight bulb holder ①
3. Remove:
 - headlight bulb ②

⚠ WARNING

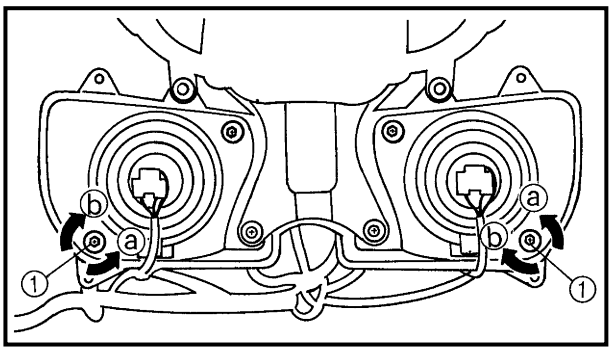
Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.

4. Install:
 - headlight bulb New
 Secure the new headlight bulb with the headlight bulb holder.

CAUTION:

Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

5. Attach:
 - headlight bulb holder
6. Install:
 - headlight bulb holder cover
7. Connect:
 - headlight coupler



EB305061
ADJUSTING THE HEADLIGHT BEAMS

The following procedure applies to both of the headlights.

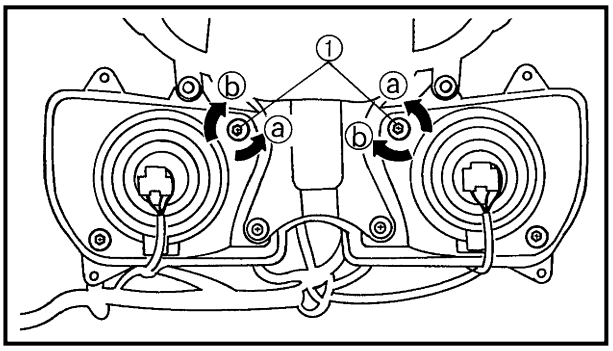
1. Adjust:
 • headlight beam (vertically)

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a. Turn the adjusting screw ① in direction ⓐ or ⓑ.

Direction ⓐ	**Headlight beam is raised.**
Direction ⓑ	**Headlight beam is lowered.**

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2. Adjust:
 • headlight beam (horizontally)

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a. Turn the adjusting knob ① in direction ⓐ or ⓑ.

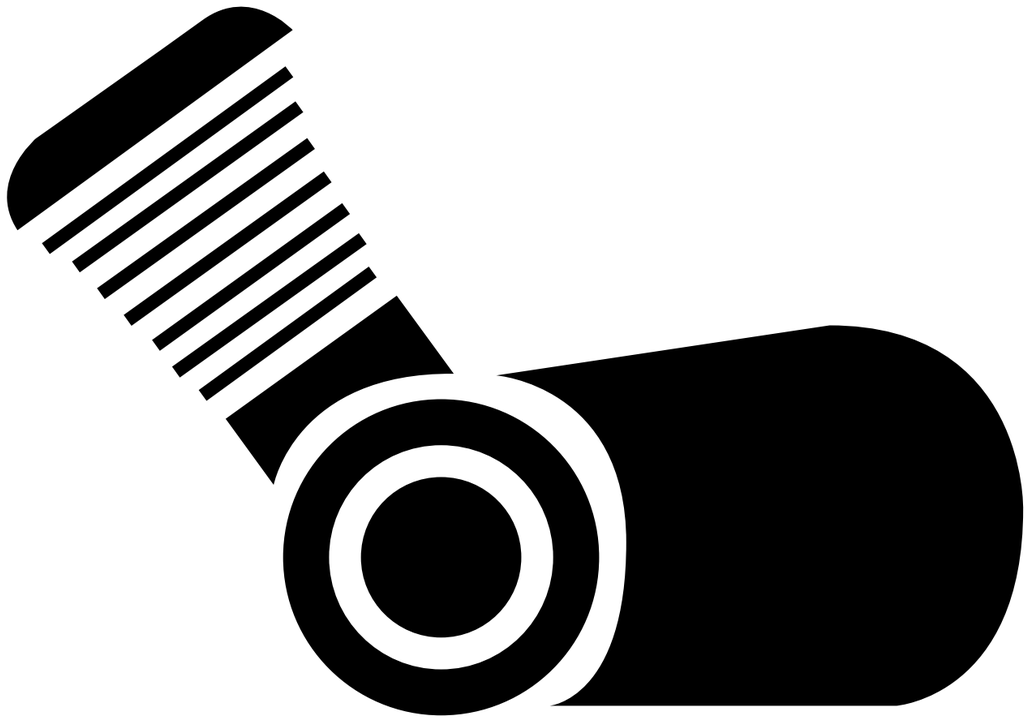
Left headlight

Direction ⓐ	**Headlight beam moves to the right.**
Direction ⓑ	**Headlight beam moves to the left.**

Right headlight

Direction ⓐ	**Headlight beam moves to the left.**
Direction ⓑ	**Headlight beam moves to the right.**

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ENG

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CHAPTER 4.
OVERHAULING THE ENGINE

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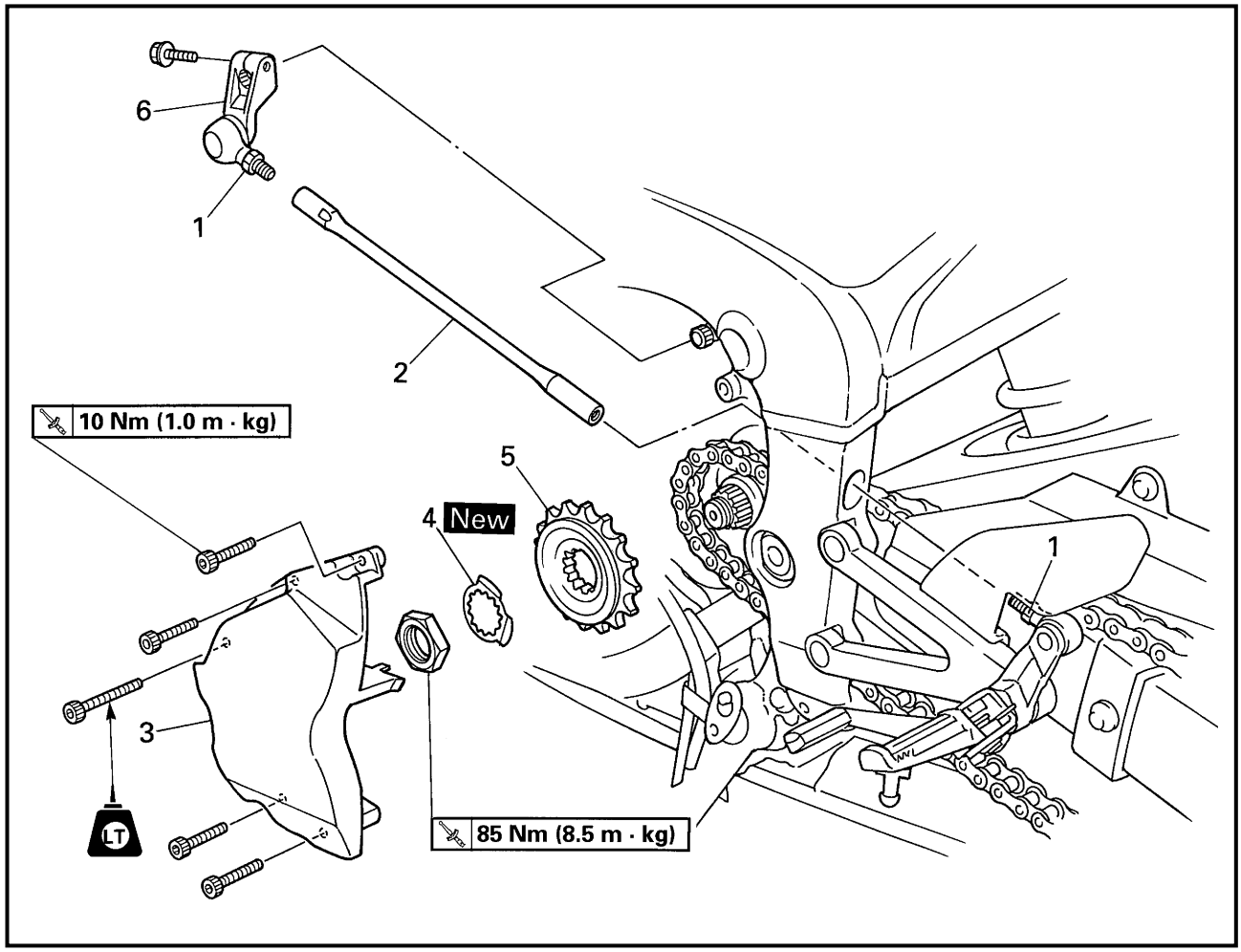
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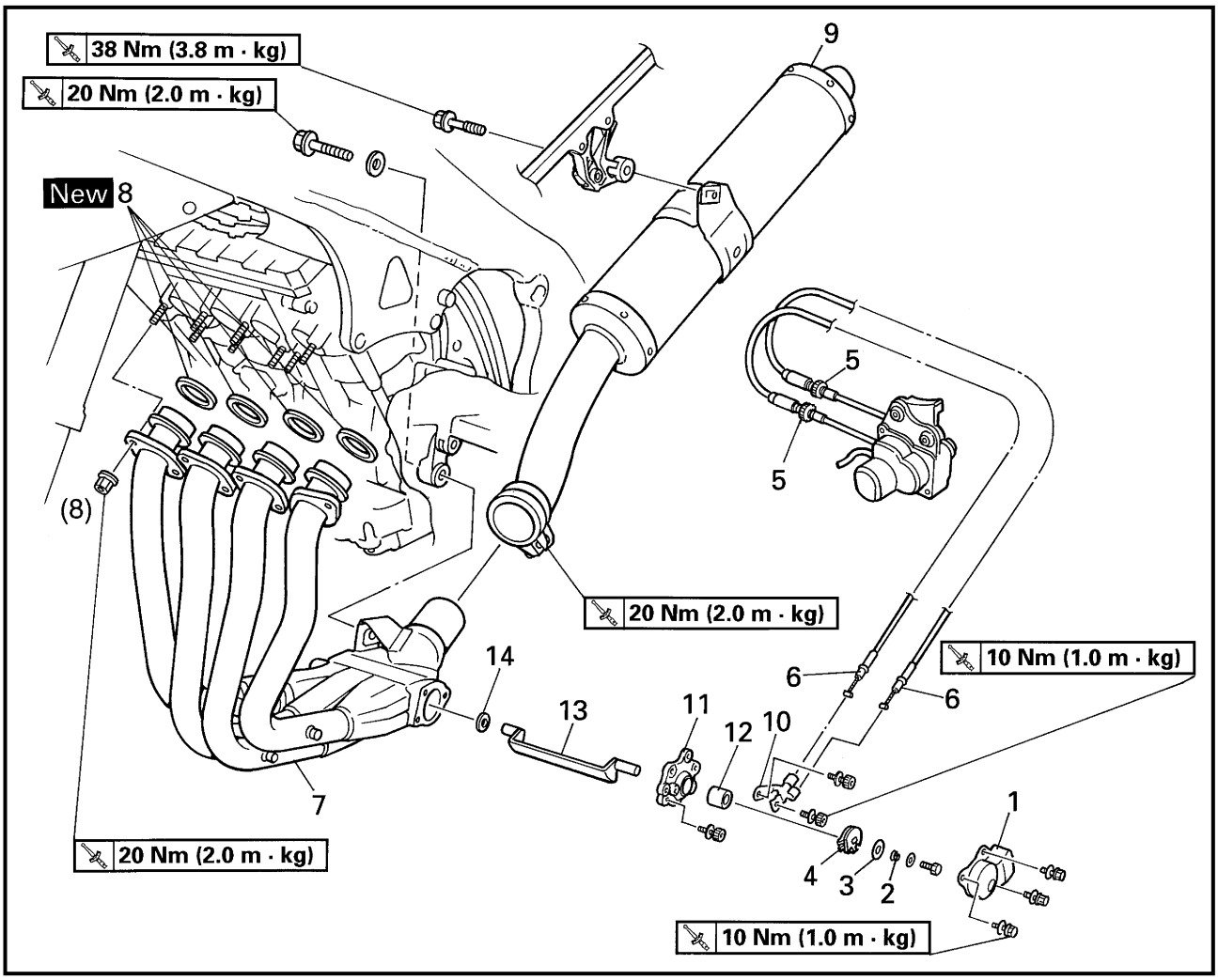
EB400011

OVERHAULING THE ENGINE

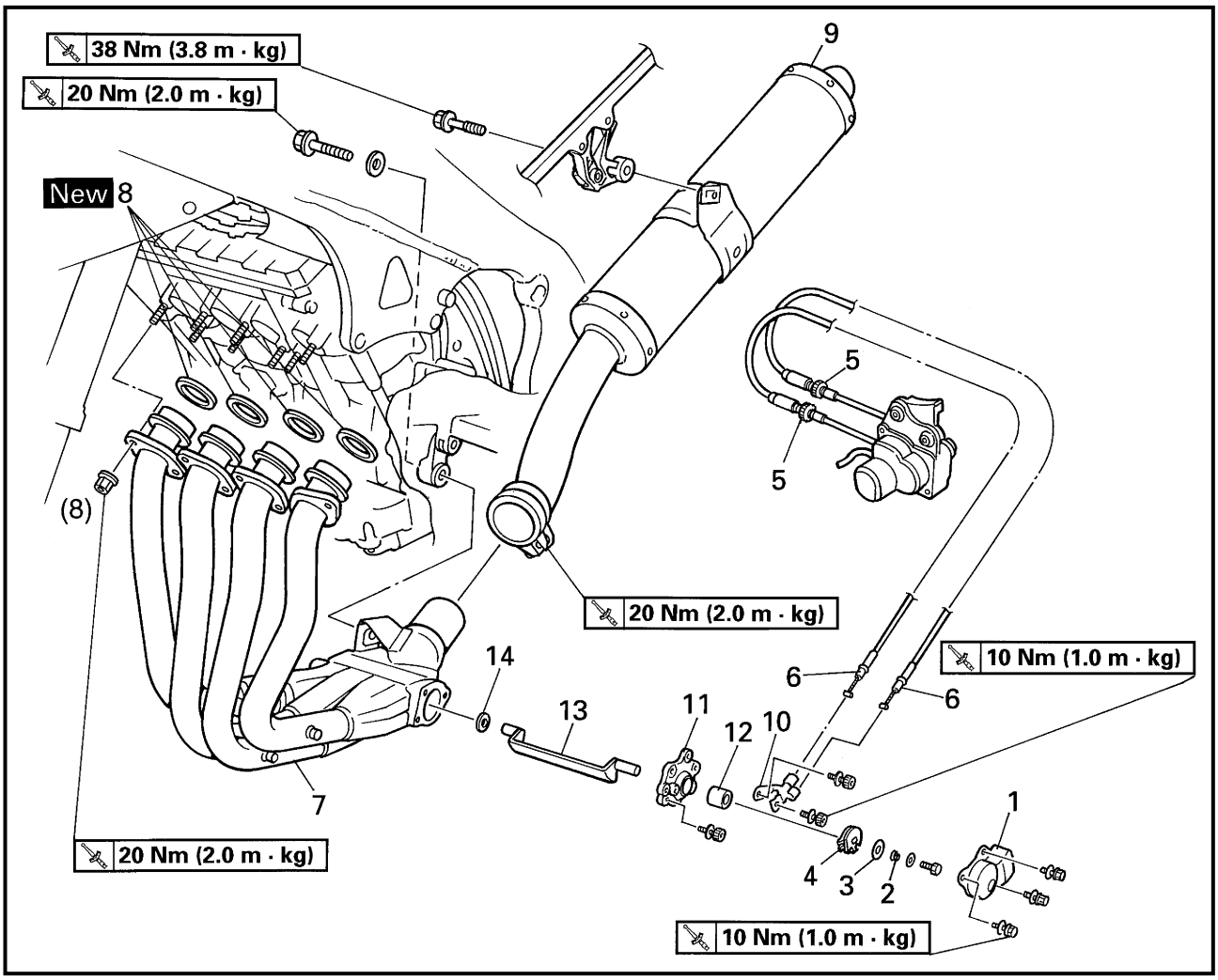
ENGINE



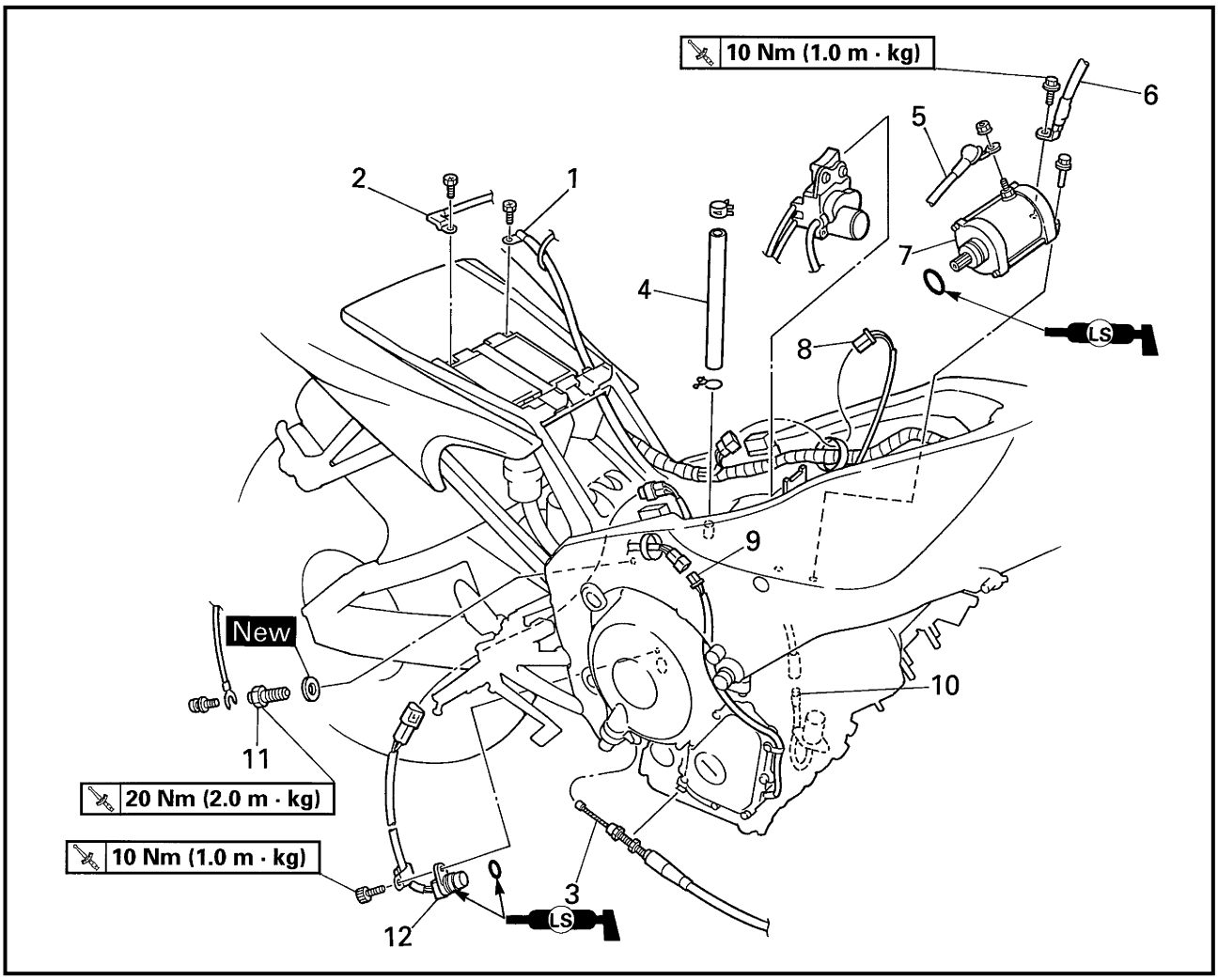
Order	Job/Part	Q'ty	Remarks
	Removing the drive sprocket		Remove the parts in the order listed.
1	Locknut	2	
2	Shift rod	1	
3	Drive sprocket cover	1	
4	Lock washer	1	
5	Drive sprocket	1	
6	Shift arm	1	
			For installation, reverse the removal procedure.



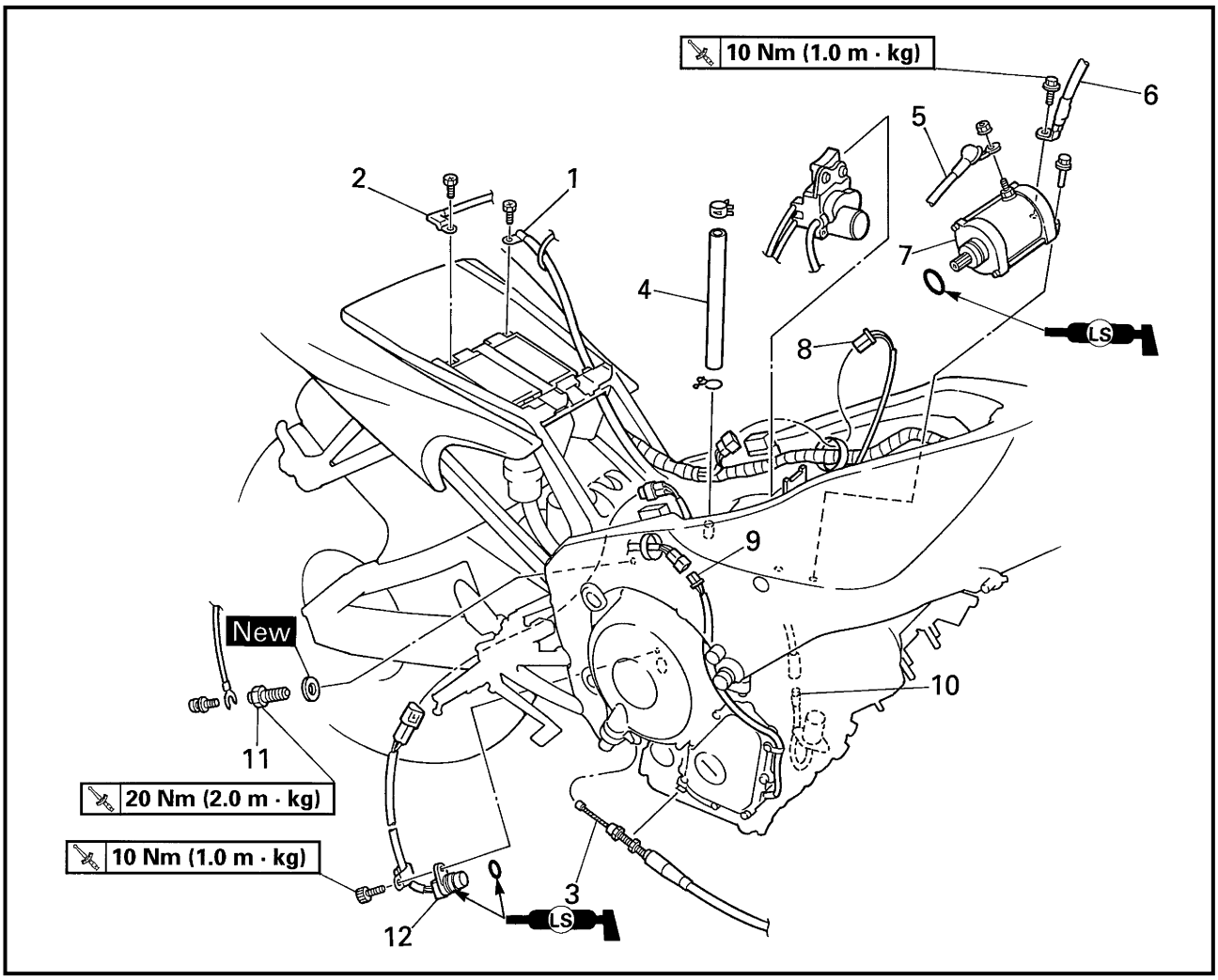
Order	Job/Part	Q'ty	Remarks
	Removing the exhaust assembly		Remove the parts in the order listed.
	Rider seat and fuel tank		Refer to "SEATS" and "FUEL TANK" in chapter 3.
	Bottom cowling and side cowlings		Refer to "COWLINGS" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
	Radiator assembly		Refer to "RADIATOR" in chapter 5.
1	EXUP valve pulley cover	1	
2	Spring	1	
3	Washer	1	
4	EXUP valve pulley	1	
5	Locknut	2	Loosen.
6	EXUP cable	2	
7	Exhaust pipe assembly	1	
8	Exhaust pipe gasket	4	



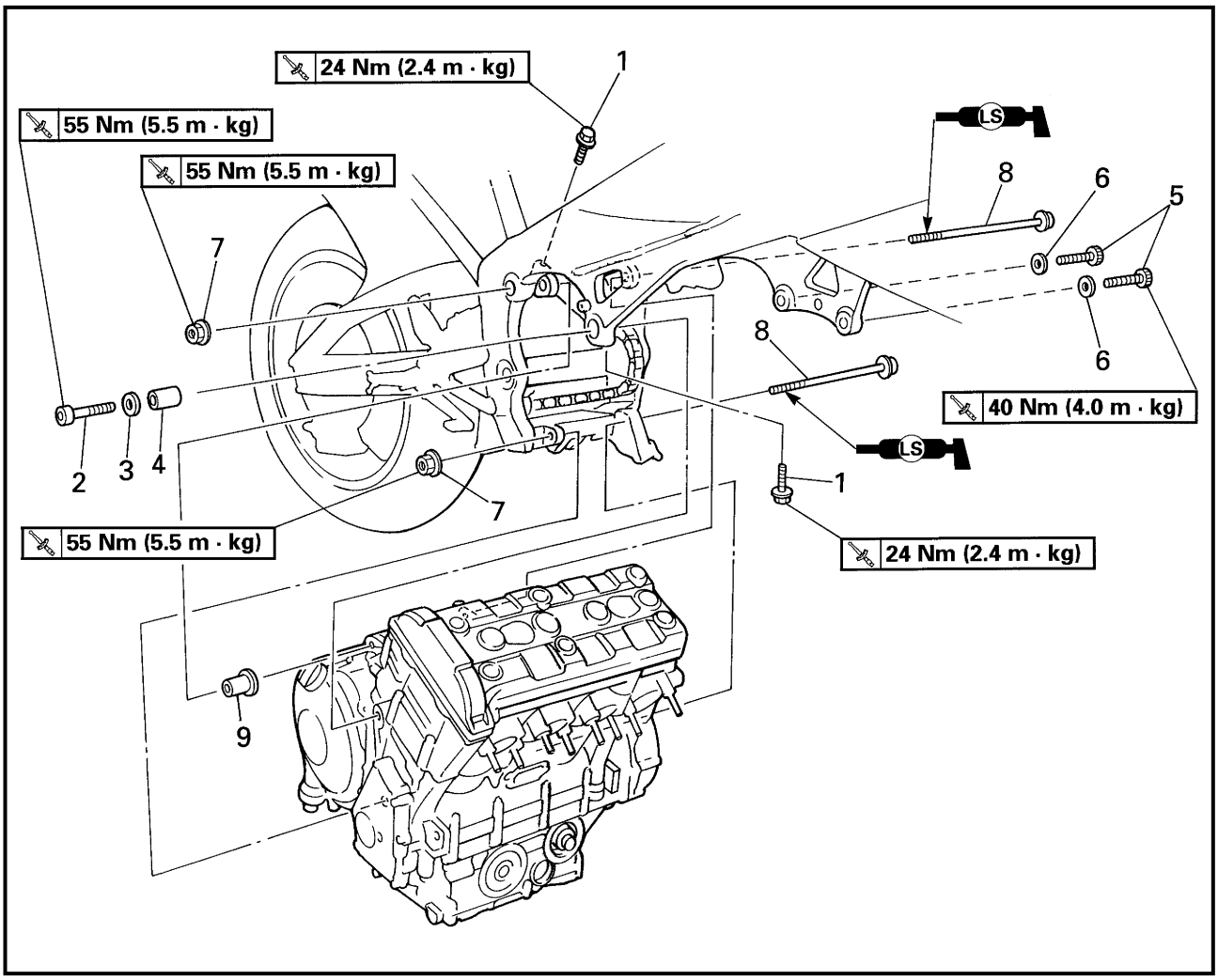
Order	Job/Part	Q'ty	Remarks
9	Muffler	1	
10	EXUP cable holder	1	
11	EXUP valve cover	1	
12	Spacer	1	
13	EXUP valve	1	
14	Spacer	1	
			For installation, reverse the removal procedure.



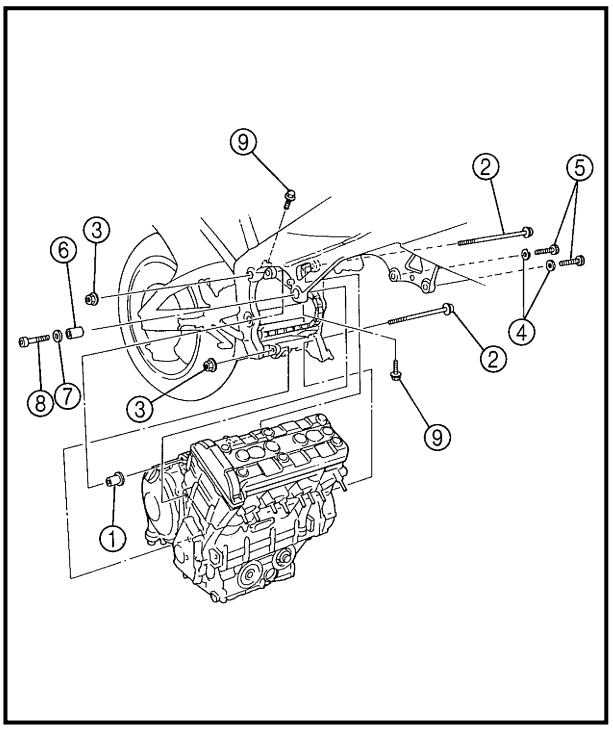
Order	Job/Part	Q'ty	Remarks
	Disconnecting the leads and hoses		Disconnect the parts in the order listed.
	Air filter case		Refer to "AIR FILTER CASE AND IGNITION COIL PLATE" in chapter 3.
	Carburetor assembly and carburetor joints		Refer to "CARBURETORS" in chapter 6.
	Engine oil and oil filter cartridge		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Oil cooler and thermostat assembly		Refer to "OIL COOLER" and "THERMOSTAT ASSEMBLY" in chapter 5.
1	Battery negative lead	1	**CAUTION:** **First, disconnect the negative lead, then the positive lead.**
2	Battery positive lead	1	



Order	Job/Part	Q'ty	Remarks
3	Clutch cable	1	
4	Crankcase breather hose	1	
5	Starter motor lead	1	Disconnect.
6	Ground lead	1	Disconnect.
7	Starter motor	1	
8	Stator coil assembly coupler	1	Disconnect.
9	Pickup coil coupler	1	Disconnect.
10	Oil level switch connector	1	Disconnect.
11	Neutral switch	1	
12	Speed sensor	1	
			For connecting, reverse the disconnection procedure.



Order	Job/Part	Q'ty	Remarks
	Removing the engine		Remove the parts in the order listed. **NOTE:** Place a suitable stand under the frame and engine.
1	Pinch bolt	2	Loosen.
2	Right front mounting bolt	1	
3	Washer	1	
4	Spacer	1	
5	Left front mounting bolt	2	
6	Washer	2	
7	Self-locking nut	2	
8	Rear mounting bolt	2	
9	Spacer	1	
			For installation, reverse the removal procedure.

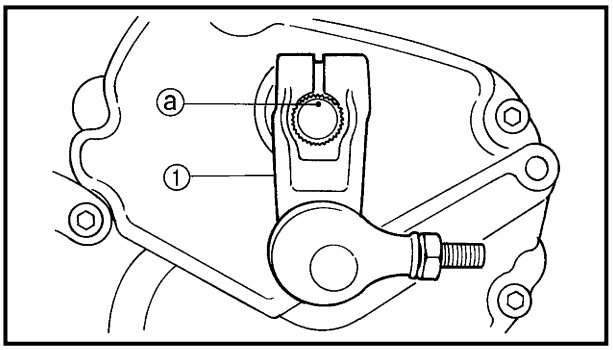


EB400700
INSTALLING THE ENGINE

1. Install:
 - spacer ①
 - rear mounting bolts ②
 - self-locking nuts ③
 - washers ④
 - left front mounting bolts ⑤
 - spacer ⑥
 - washer ⑦
 - right front mounting bolt ⑧

NOTE:
- Lubricate the rear mounting bolt threads with lithium soap base grease.
- Do not fully tighten the nuts and bolts.

2. Tighten:
 - self-locking nut **55 Nm (5.5 m · kg)**
 - left front mounting bolts **40 Nm (4.0 m · kg)**
 - right front mounting bolt **55 Nm (5.5 m · kg)**
 - pinch bolts ⑨ **24 Nm (2.4 m · kg)**



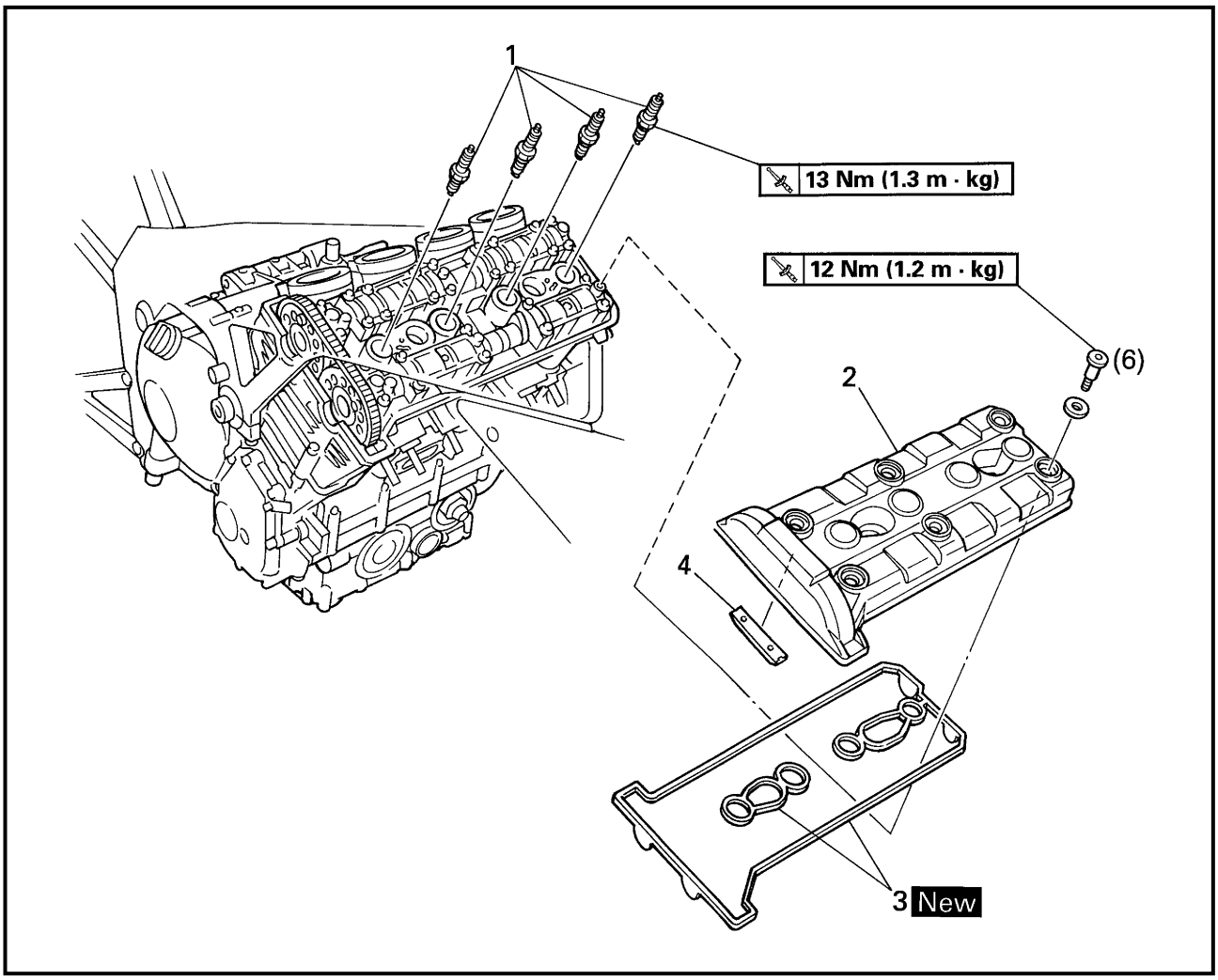
3. Install:
 - shift arm① **10 Nm (1.0 m · kg)**

NOTE:
Align the punch mark ⓐ in the shift shaft with the slot in the shift arm.

4. Install:
 - drive sprocket cover **10 Nm (1.0 m · kg)**

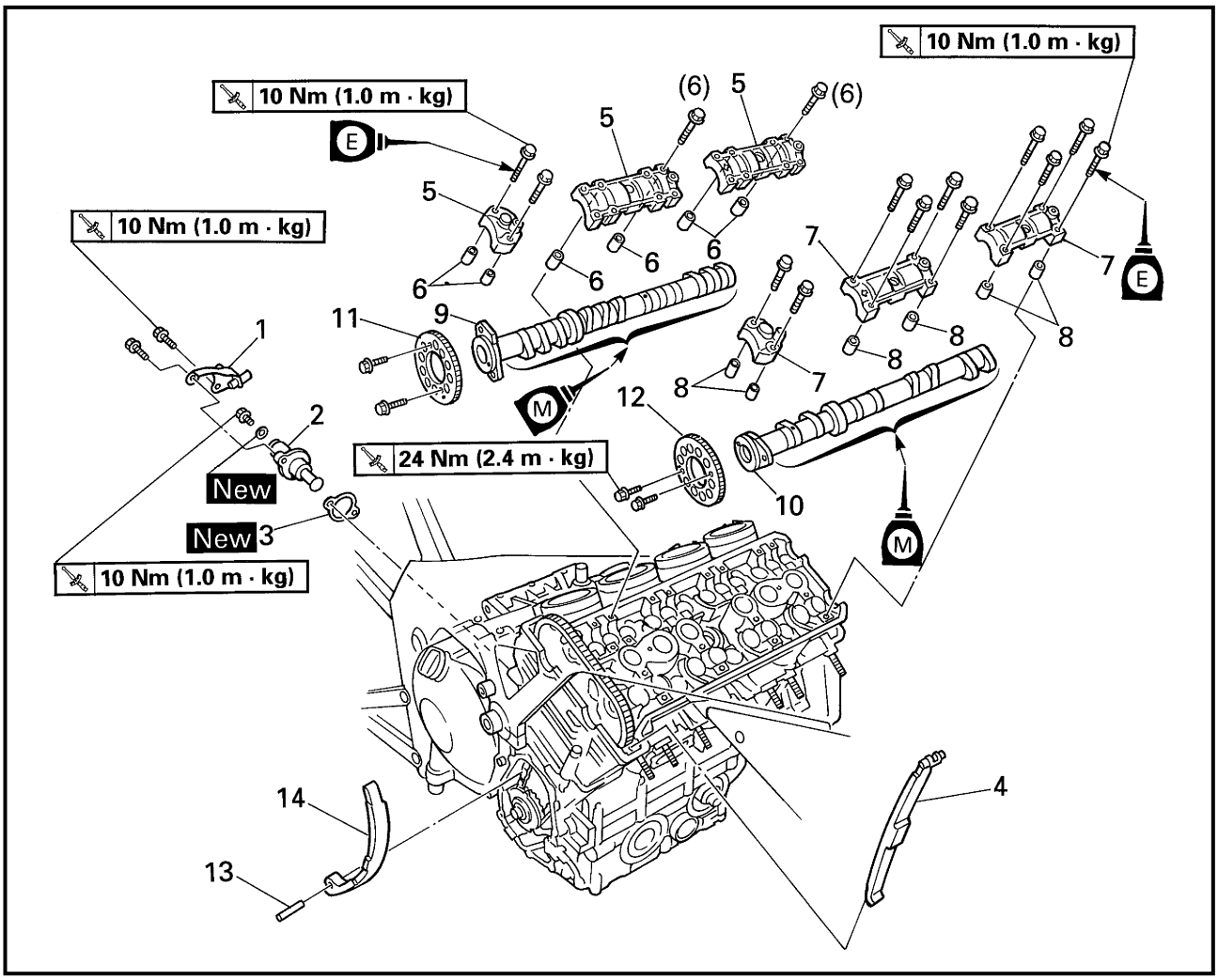
NOTE:
Refer to "CABLE ROUTING" in chapter 2.

EB401000
CAMSHAFTS

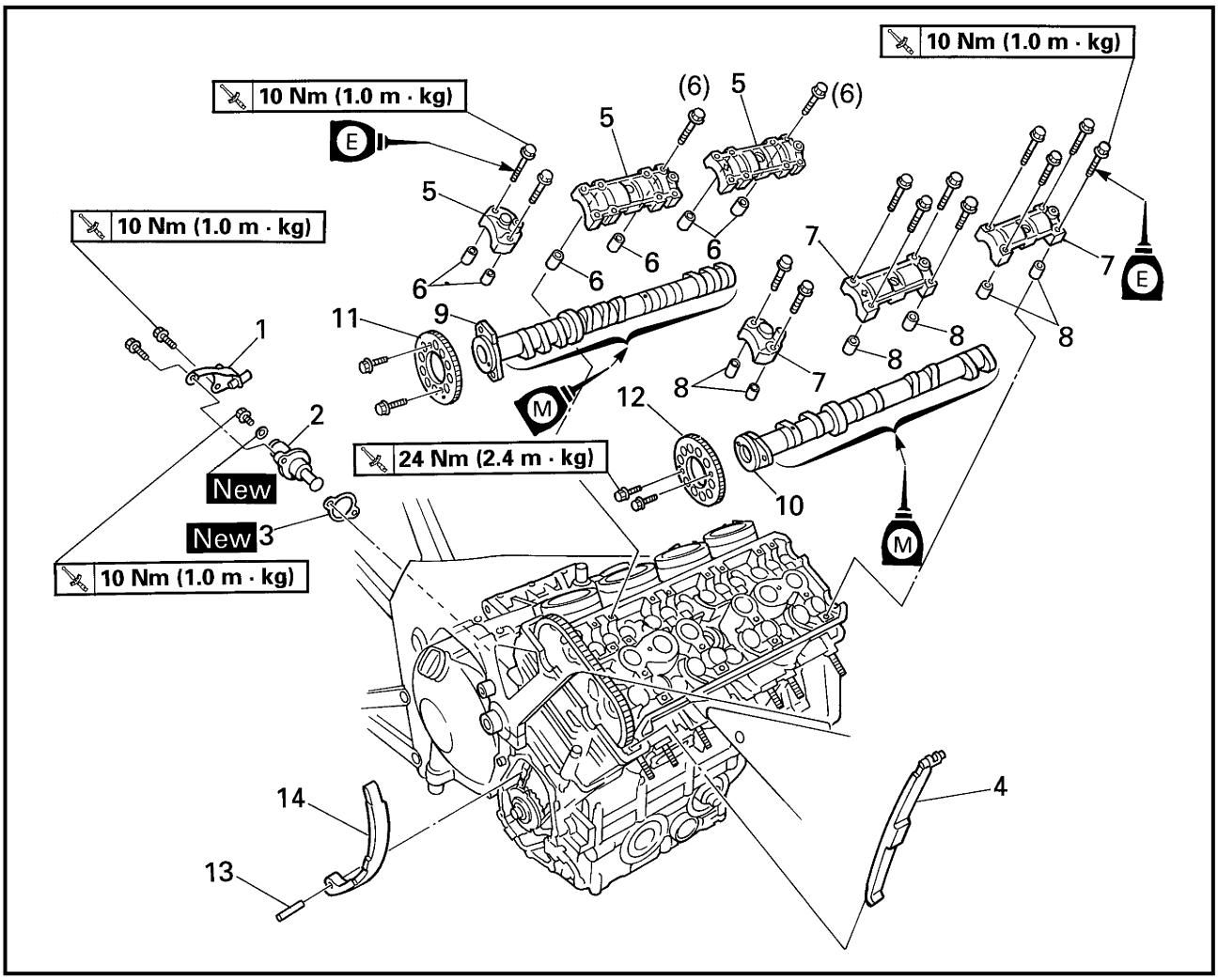


Order	Job/Part	Q'ty	Remarks
	Removing the cylinder head cover		Remove the parts in the order listed.
	Carburetor assembly		Refer to "CARBURETORS" in chapter 6.
	Radiator assembly and thermostat assembly		Refer to "RADIATOR" and "THERMOSTAT ASSEMBLY" in chapter 5.
1	Spark plug	4	
2	Cylinder head cover	1	
3	Cylinder head cover gasket	1	
4	Timing chain guide (top side)	1	
			For installation, reverse the removal procedure.

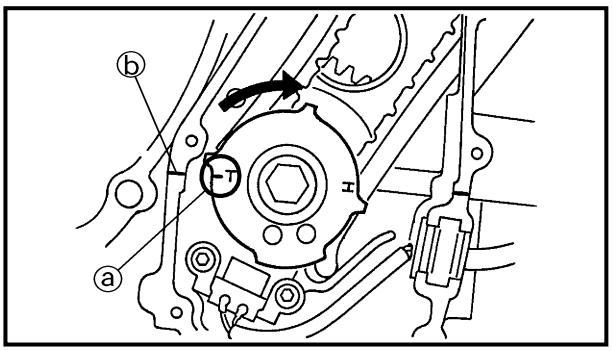
EB401011



Order	Job/Part	Q'ty	Remarks
	Removing the camshafts		Remove the parts in the order listed.
	Pickup coil rotor cover		Refer to "PICKUP COIL".
1	Float chamber air vent hose holder	1	
2	Timing chain tensioner	1	
3	Timing chain tensioner gasket	1	
4	Timing chain guide (exhaust side)	1	
5	Intake camshaft cap	3	**NOTE:** During removal, the dowel pins may still be connected to the camshaft caps.
6	Dowel pin	6	
7	Exhaust camshaft cap	3	
8	Dowel pin	6	
9	Intake camshaft	1	
10	Exhaust camshaft	1	



Order	Job/Part	Q'ty	Remarks
11	Intake camshaft sprocket	1	
12	Exhaust camshaft sprocket	1	
13	Pin	1	
14	Timing chain guide (intake side)	1	
			For installation, reverse the removal procedure.



EB401101
REMOVING THE CAMSHAFTS

1. Align:
 • TDC mark on the pickup coil rotor (with the crankcase mating surface)

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a. Turn the crankshaft clockwise.

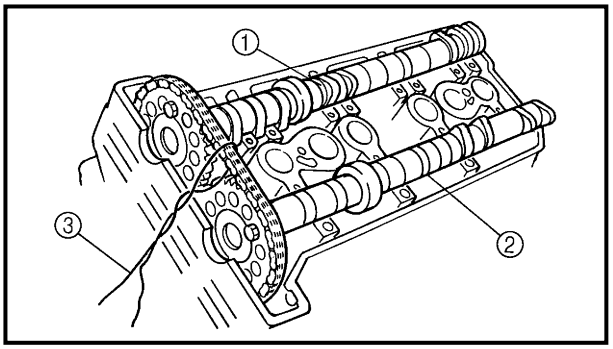
b. When piston #1 is at TDC on the compression stroke, align the TDC mark ⓐ on the pickup coil rotor with the crankcase mating surface ⓑ.

NOTE:
TDC on the compression stroke can be found when the camshaft lobes are turned away from each other.

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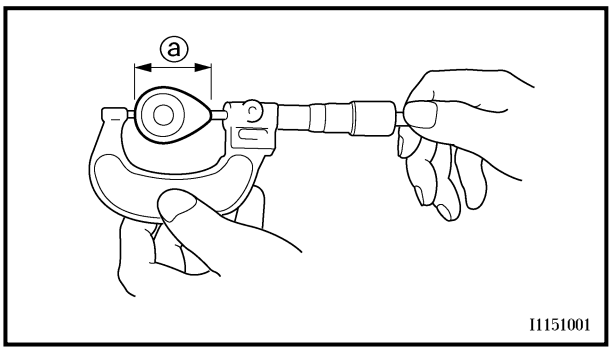
2. Remove:
 • float chamber air vent hose holder
 • timing chain tensioner
3. Remove:
 • timing chain guide (exhaust side)
4. Remove:
 • camshaft caps
 • dowel pins

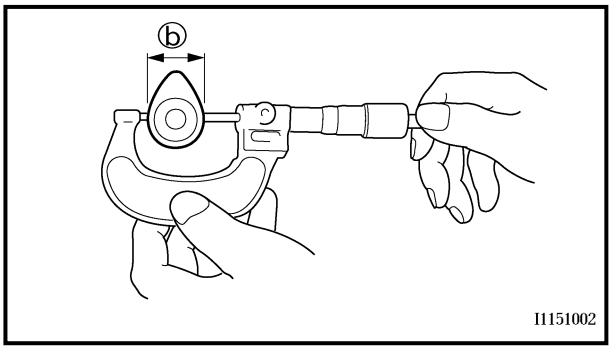
CAUTION:
To prevent damage to the cylinder head, camshafts or camshaft caps, loosen the camshaft cap bolts in stages and in a crisscross pattern, working from the outside in.

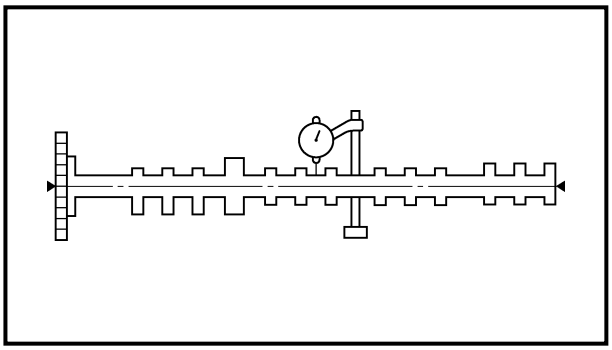


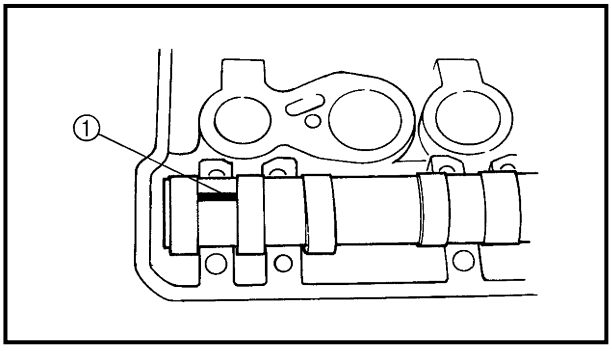
5. Remove:
 • intake camshaft ①
 • exhaust camshaft ②

NOTE:
To prevent the timing chain from falling into the crankcase, fasten it with a wire ③.









EB401401
CHECKING THE CAMSHAFTS

1. Check:
 • camshaft lobes
 Blue discoloration/pitting/scratches → Replace the camshaft.
2. Measure:
 • camshaft lobe dimensions ⓐ and ⓑ
 Out of specification → Replace the camshaft.

Camshaft lobe dimensions limit
Intake camshaft
ⓐ 32.40 mm
ⓑ 24.85 mm
Exhaust camshaft
ⓐ 32.85 mm
ⓑ 24.85 mm

3. Measure:
 • camshaft runout
 Out of specification → Replace.

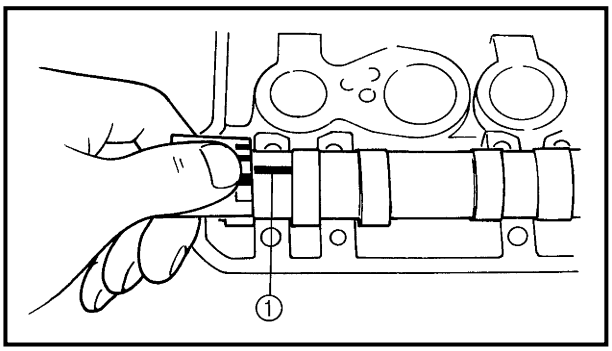
Max. camshaft runout
0.03 mm

4. Measure:
 • camshaft-journal-to-camshaft-cap clearance
 Out of specification → Measure the camshaft journal diameter.

Camshaft-journal-to-camshaft-cap clearance
0.050 ~ 0.084 mm

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a. Install the camshaft into the cylinder head (without the dowel pins and camshaft caps).
b. Position a strip of Plastigauge® ① onto the camshaft journal as shown.
c. Install the dowel pins and camshaft caps.

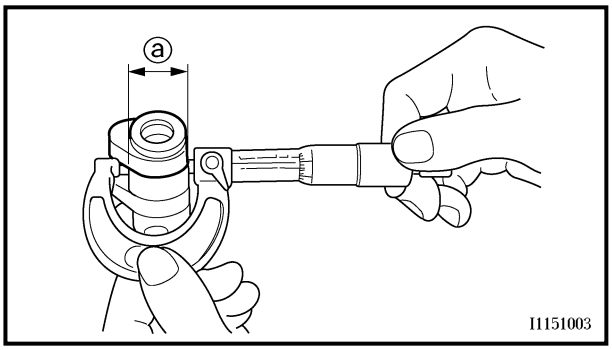


NOTE:
- Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.
- Do not turn the camshaft when measuring the camshaft-journal-to-camshaft-cap clearance with the Plastigauge®.

Camshaft cap bolt
10 Nm (1.0 m • kg)

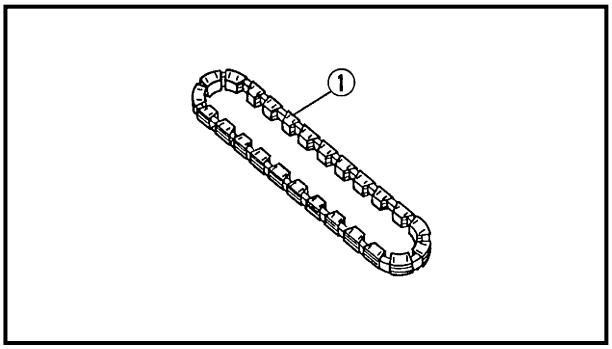
d. Remove the camshaft caps and then measure the width of the Plastigauge® ①.

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5. Measure:
 - camshaft journal diameter ⓐ
 Out of specification → Replace the camshaft.
 Within specification → Replace the cylinder head and the camshaft caps as a set.

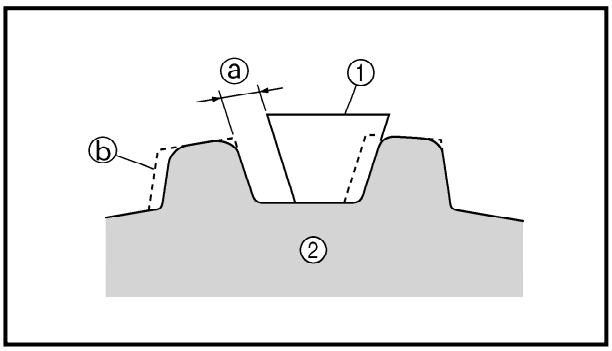
Camshaft journal diameter
24.437 ~ 24.450 mm



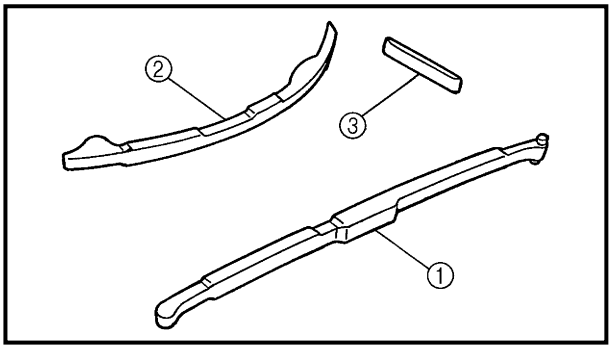
EB401421
CHECKING THE TIMING CHAIN, CAMSHAFT SPROCKETS, AND TIMING CHAIN GUIDES

The following procedure applies to all of the camshaft sprockets and timing chain guides.

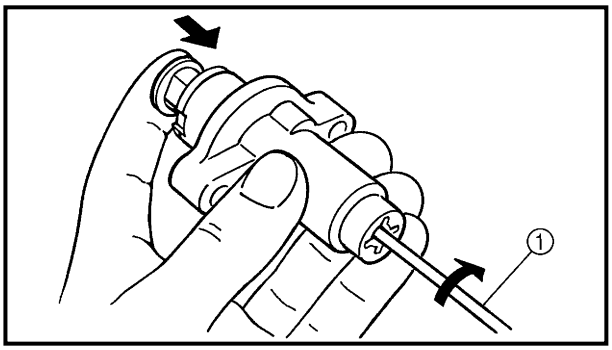
1. Check:
 - timing chain ①
 Damage/stiffness → Replace the timing chain and camshaft sprockets as a set.

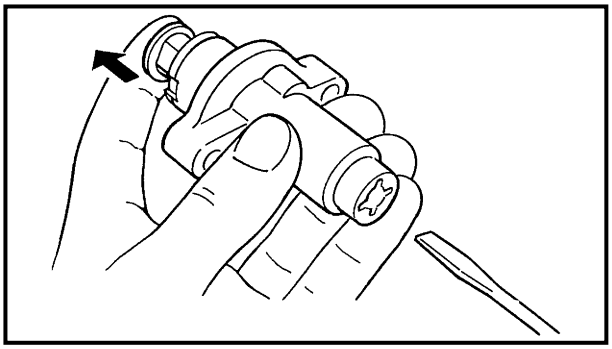


2. Check:
 • camshaft sprocket
 More than 1/4 tooth wear ⓐ → Replace the camshaft sprockets and the timing chain as a set.
 ⓐ 1/4 tooth
 ⓑ Correct
 ① Timing chain roller
 ② Camshaft sprocket



3. Check:
 • timing chain guide (exhaust side) ①
 • timing chain guide (intake side) ②
 • timing chain guide (top side) ③
 Damage/wear → Replace the defective part(-s).





EB401430
CHECKING THE TIMING CHAIN TENSIONER

1. Check:
 • timing chain tensioner
 Cracks/damage/rough movement → Replace.

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a. Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.

NOTE:
While pressing the timing chain tensioner rod, wind it clockwise with a thin screwdriver ① until it stops.

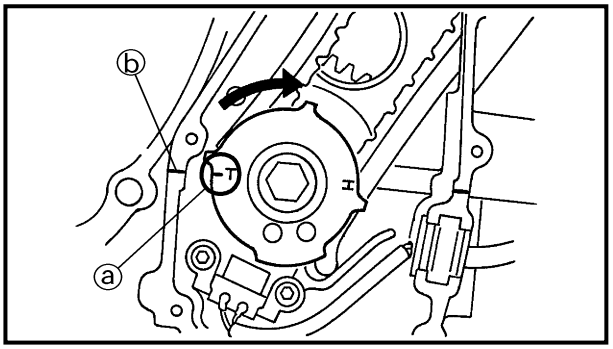
b. Remove the screwdriver and slowly release the timing chain tensioner rod.

c. Make sure that the timing chain tensioner rod comes out of the timing chain tensioner housing smoothly. If there is rough movement, replace the timing chain tensioner.

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EB401701
INSTALLING THE CAMSHAFTS

1. Install:
 • timing chain guide (intake side) ①
2. Install:
 • intake camshaft sprocket
 24 Nm (2.4 m · kg)
 • exhaust camshaft sprocket
 24 Nm (2.4 m · kg)



3. Install:
 • exhaust camshaft
 • intake camshaft
 • exhaust camshaft caps
 • intake camshaft caps

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a. Turn the crankshaft clockwise.

b. When piston #1 is at TDC on the compression stroke, align the TDC ⓐ mark on the pickup coil rotor with the crankcase mating surface ⓑ.

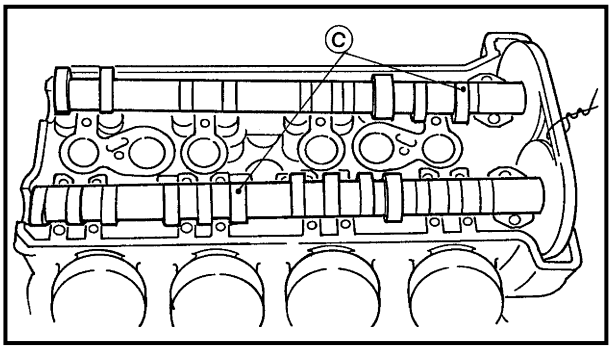
c. Install the timing chain onto both camshaft sprockets and then install the camshaft sprockets onto the camshafts.

CAUTION:

Do not turn the crankshaft when installing the camshaft to avoid damage or improper valve timing.

NOTE:

Make sure that the punch marks ⓒ on the camshafts face up.

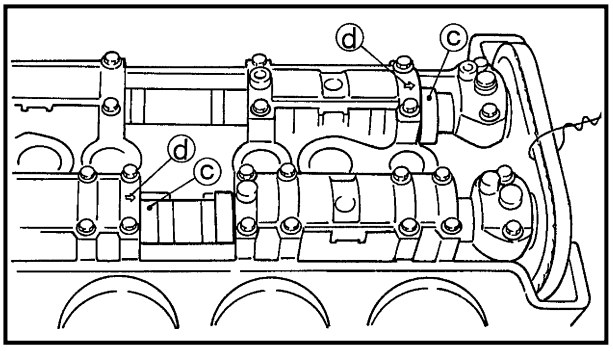


d. Install the exhaust and intake camshaft caps.

	Camshaft cap bolt **10 Nm (1.0 m • kg)**

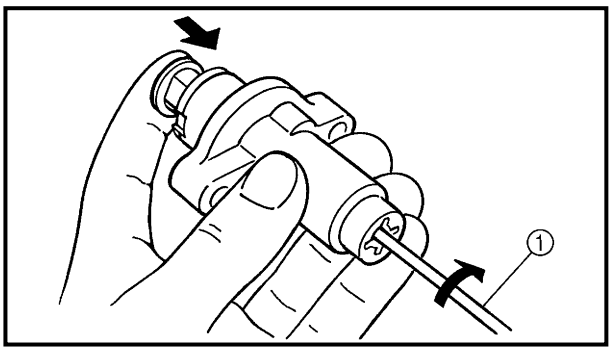
NOTE:

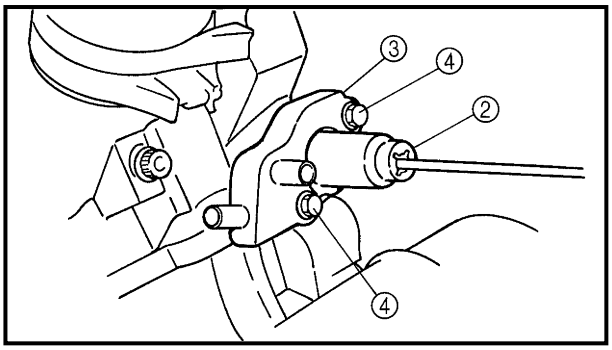
Make sure that the punch marks ⓒ on the camshafts are aligned with the arrow marks ⓓ on the camshaft caps. Out of alignment → Reinstall.



e. Remove the wire from the timing chain.

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4. Install:
 • timing chain guide (exhaust side)
5. Install:
 • timing chain tensioner

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a. Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.
b. While pressing the timing chain tensioner rod, wind it clockwise with a thin screwdriver ① until it stops.
c. With the screwdriver still inserted into the timing chain tensioner, install the timing chain tensioner ②, gasket, and float chamber air vent hose holder ③ onto the cylinder block. Then, tighten the timing chain tensioner bolts ④ to the specified torque.

⚠ WARNING

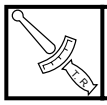
Always use a new gasket.

NOTE:

The "UP" mark on the timing chain tensioner should face up.

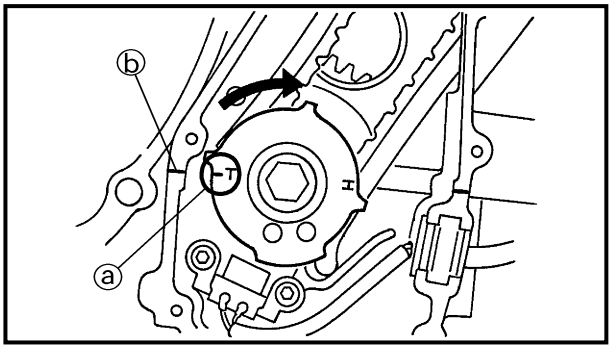
	**Timing chain tensioner bolt** **10 Nm (1.0 m • kg)**

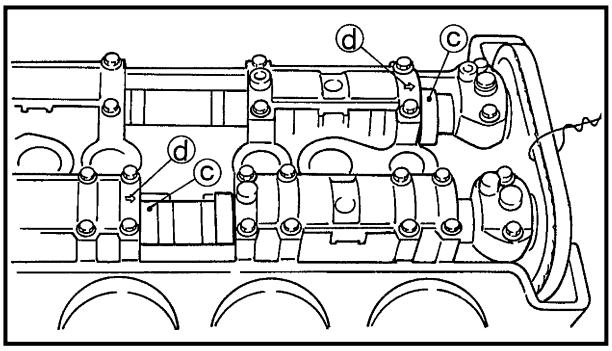
d. Remove the screwdriver, make sure that the timing chain tensioner rod releases, and tighten the cap bolt to the specified torque.

	**Cap bolt** **10 Nm (1.0 m • kg)**

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6. Turn:
 • crankshaft
 (several turns counterclockwise)





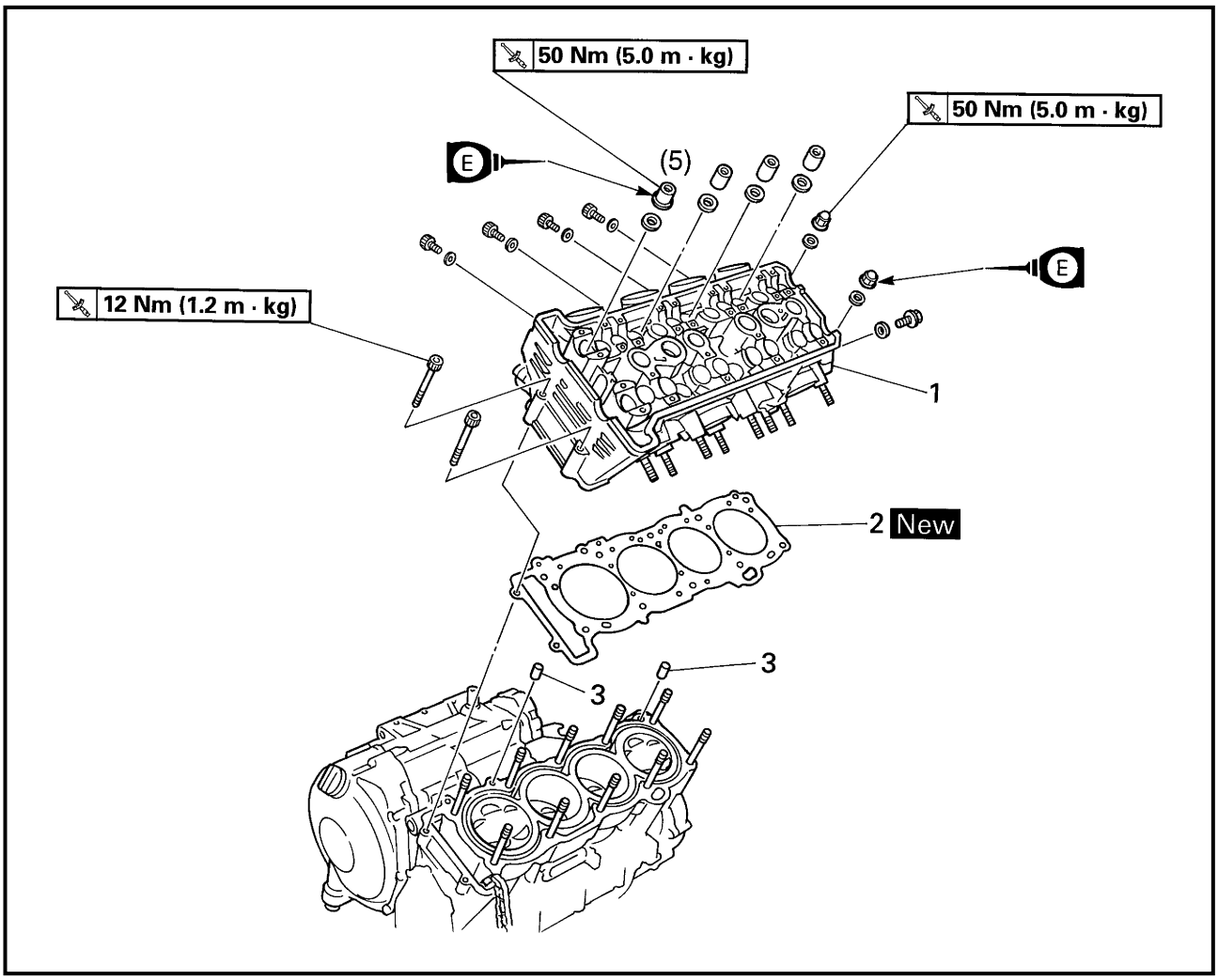
7. Check:
 - TDC mark ⓐ
 Make sure that the TDC mark is aligned with the crankcase mating surface ⓑ.
 - camshaft punch mark ⓒ
 Make sure that the camshaft punch mark is aligned with the arrow mark ⓓ on the camshaft cap.
 Out of alignment → Adjust.
 Refer to the installation steps above.

8. Measure:
 - valve clearance
 Out of specification → Adjust.
 Refer to "ADJUSTING THE VALVE CLEARANCE" in chapter 3.

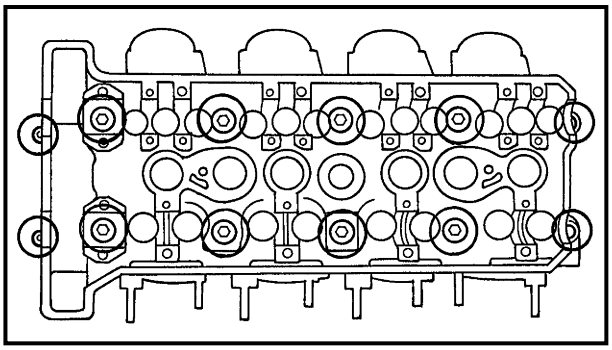
9. Install:
 - cylinder head cover gasket
 - cylinder head cover

NOTE:
- Apply bond TB1541 onto the mating surfaces of the cylinder head cover and cylinder head cover gasket.
- Apply bond 1215B onto the mating surfaces of the cylinder head cover gasket and cylinder head.
- Tighten the cylinder head cover bolts in stages and in a crisscross pattern.

EB402000
CYLINDER HEAD



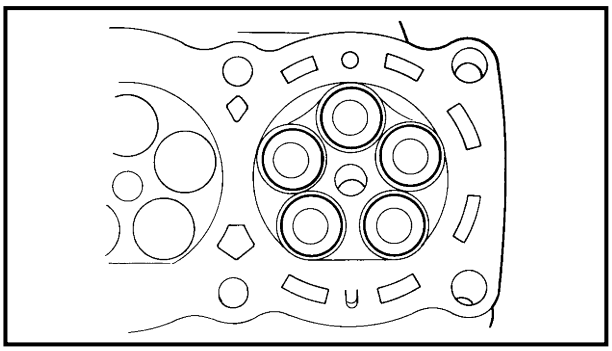
Order	Job/Part	Q'ty	Remarks
	Removing the cylinder head		Remove the parts in the order listed.
	Engine		Refer to "ENGINE".
	Intake and exhaust camshafts		Refer to "CAMSHAFTS".
1	Cylinder head	1	
2	Cylinder head gasket	1	
3	Dowel pin	2	
			For installation, reverse the removal procedure.



EB402102
REMOVING THE CYLINDER HEAD

1. Remove:
 • cylinder head bolts
 • cylinder head nuts

NOTE:
Loosen each bolt and nut 1/2 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts and nuts are fully loosened, remove them.

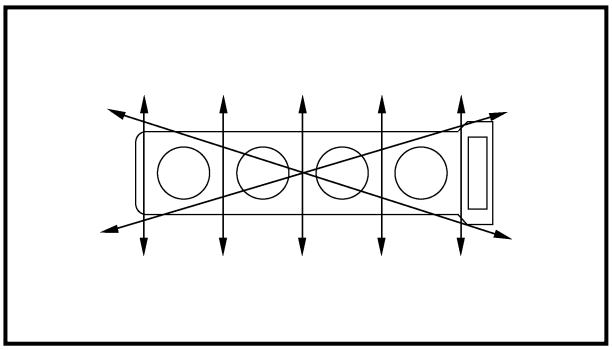


EB402402
CHECKING THE CYLINDER HEAD

1. Eliminate:
 • combustion chamber carbon deposits (with a rounded scraper)

NOTE:
Do not use a sharp instrument to avoid damaging or scratching:
• spark plug bore threads
• valve seats

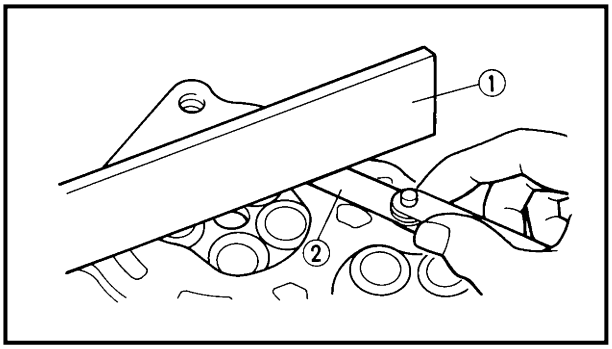
2. Check:
 • cylinder head
 Damage/scratches → Replace.
 • cylinder head water jacket
 Mineral deposits/rust → Eliminate.



3. Measure:
 • cylinder head warpage
 Out of specification → Resurface the cylinder head.

Max. cylinder head warpage
0.1 mm

a. Place a straightedge ① and a thickness gauge ② across the cylinder head.



b. Measure the warpage.

c. If the limited is exceeded, resurface the cylinder head as follows.

d. Place a 400 ~ 600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

NOTE:
To ensure an even surface, rotate the cylinder head several times.

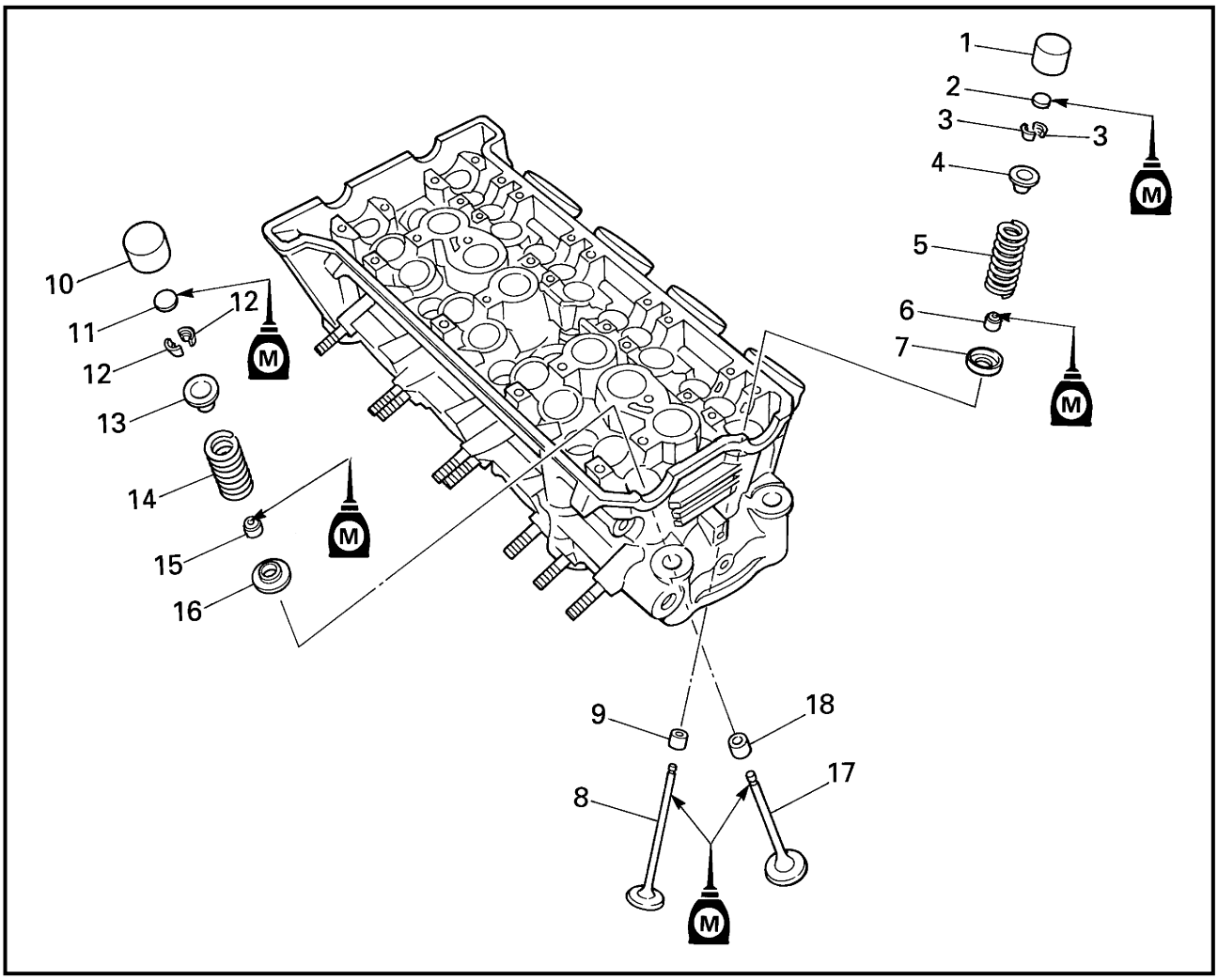
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EB402702
INSTALLING THE CYLINDER HEAD

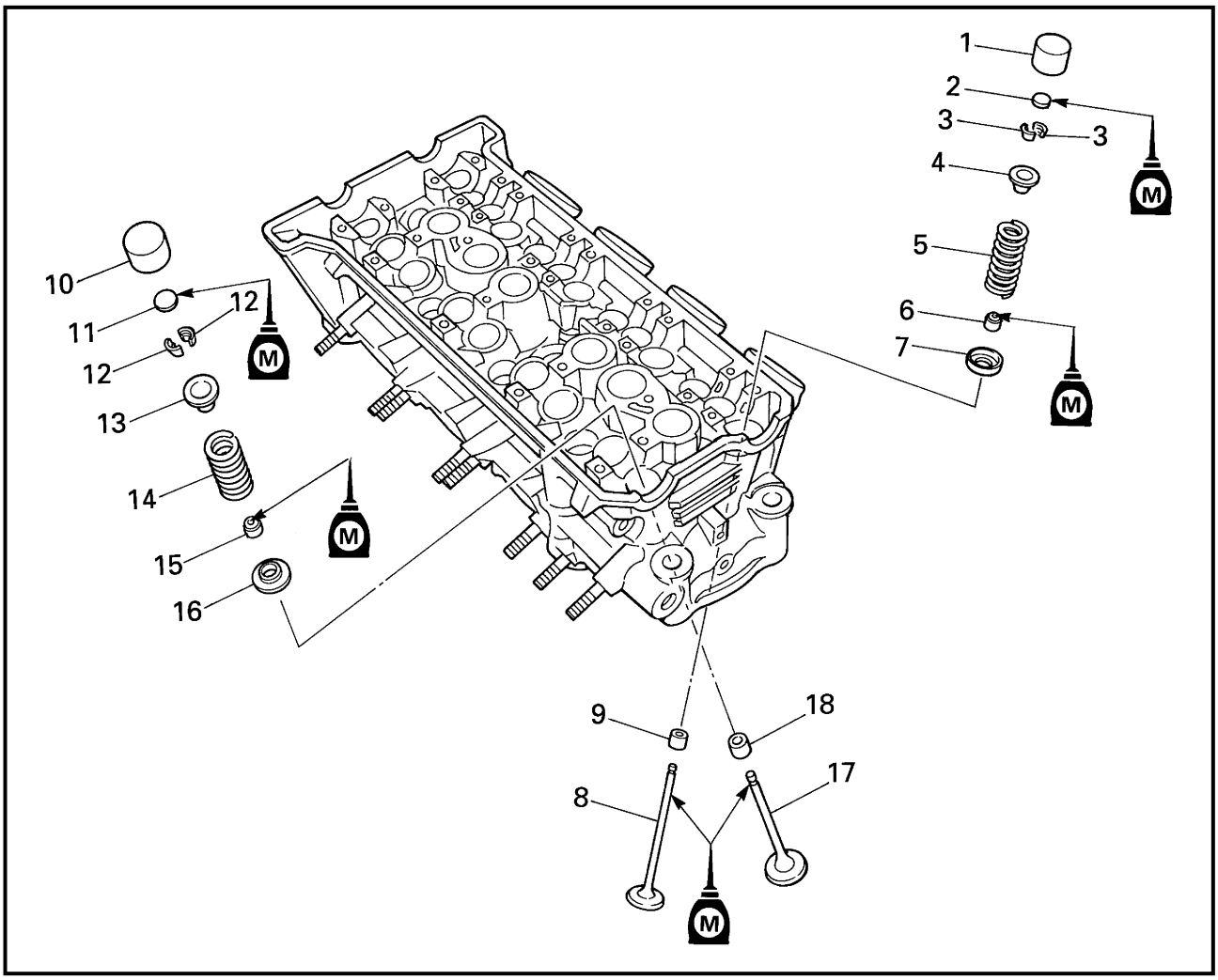
1. Install:
 - cylinder head
 - cylinder head nut — **50 Nm (5.0 m · kg)**
 - cylinder head bolt — **12 Nm (1.2 m · kg)**

NOTE:
- Lubricate the cylinder head nuts with engine oil.
- Tighten the cylinder head nuts and bolts in two stages and in a crisscross pattern.

EB403000
VALVES AND VALVE SPRINGS



Order	Job/Part	Q'ty	Remarks
	Removing the valves and valve springs		Remove the parts in the order listed.
	Cylinder head		Refer to "CYLINDER HEAD".
1	Intake valve lifter	12	
2	Intake valve pad	12	
3	Intake valve cotter	24	
4	Intake valve upper spring seat	12	
5	Intake valve spring	12	
6	Intake valve oil seal	12	
7	Intake valve lower spring seat	12	
8	Intake valve	12	
9	Intake valve guide	12	

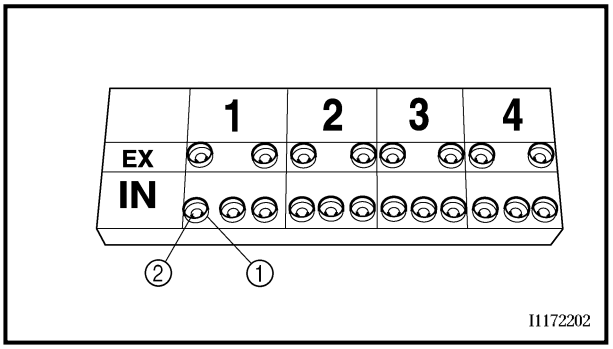


Order	Job/Part	Q'ty	Remarks
10	Exhaust valve lifter	12	
11	Exhaust valve pad	12	
12	Exhaust valve cotter	24	
13	Exhaust valve upper spring seat	12	
14	Exhaust valve spring	12	
15	Exhaust valve oil seal	12	
16	Exhaust valve lower spring seat	12	
17	Exhaust valve	12	
18	Exhaust valve guide	12	
			For installation, reverse the removal procedure.

EB403100
REMOVING THE VALVES

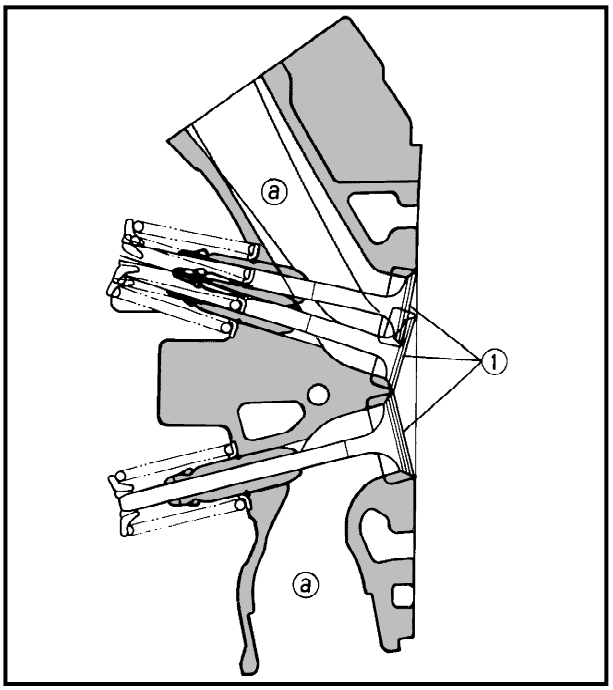
The following procedure applies to all of the valves and related components.

NOTE:
Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure that the valves properly seal.



1. Remove:
 - valve lifter ①
 - valve pad ②

NOTE:
Make a note of the position of each valve lifter and valve pad so that they can be reinstalled in their original place.



2. Check:
 - valve
 (for leakage)
 Leakage at the valve seat → Check the valve face, valve seat, and valve seat width.
 Refer to "CHECKING THE VALVE SEATS".

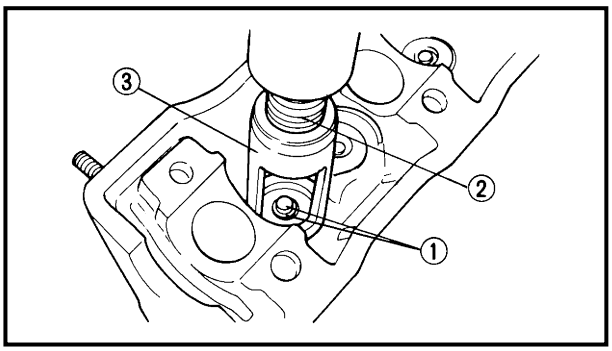
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a. Pour a clean solvent ⓐ into the intake and exhaust ports.

b. Check that the valves properly seal.

NOTE:
There should be no leakage at the valve seat ①.

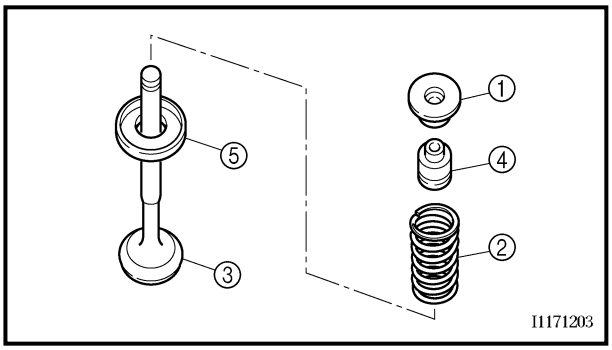
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3. Remove:
 • valve cotters ①

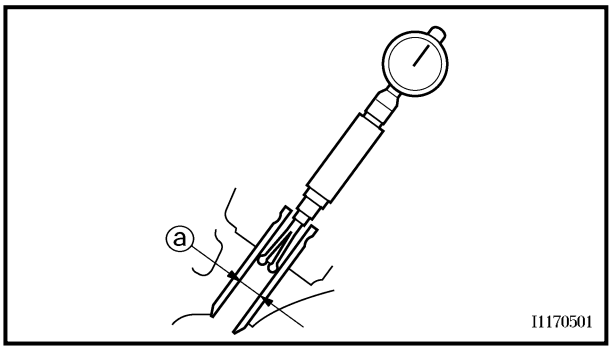
NOTE:
Remove the valve cotters by compressing the valve spring with the valve spring compressor ② and attachment ③.

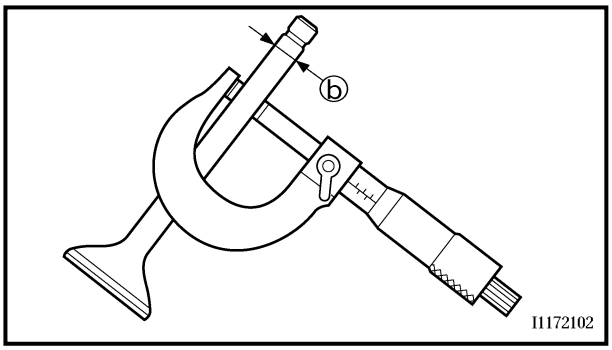
Valve spring compressor
90890-04019
Attachment
(for the intake valve)
90890-04114
(for the exhaust valve)
90890-04108



4. Remove:
 • upper spring seat ①
 • valve spring ②
 • valve ③
 • oil seal ④
 • lower spring seat ⑤

NOTE:
Identify the position of each part very carefully so that it can be reinstalled in its original place.





EB403400
CHECKING THE VALVES AND VALVE GUIDES

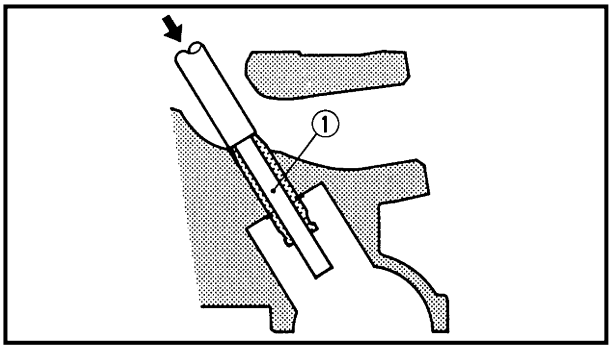
The following procedure applies to all of the valves and valve guides.

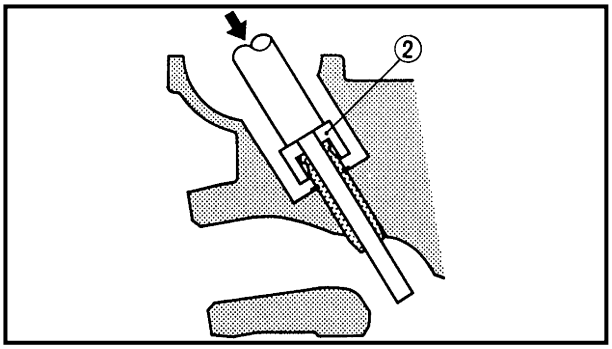
1. Measure:
 • valve-stem-to-valve-guide clearance

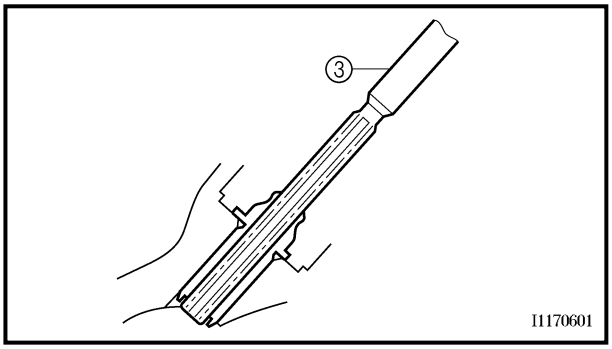
Valve-stem-to-valve-guide clearance = Valve guide inside diameter ⓐ – Valve stem diameter ⓑ

Out of specification → Replace the valve guide.

Valve-stem-to-valve-guide clearance
Intake
0.010 ~ 0.037 mm
<Limit>: 0.08 mm
Exhaust
0.025 ~ 0.052 mm
<Limit>: 0.1 mm







2. Replace:
 • valve guide

NOTE:
To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100 °C in an oven.

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a. Remove the valve guide with a valve guide remover ①.

b. Install the new valve guide with the valve guide installer ② and valve guide remover ①.

c. After installing the valve guide, bore the valve guide with a valve guide reamer ③ to obtain the proper valve-stem-to-valve-guide clearance.

NOTE:
After replacing the valve guide, reface the valve seat.

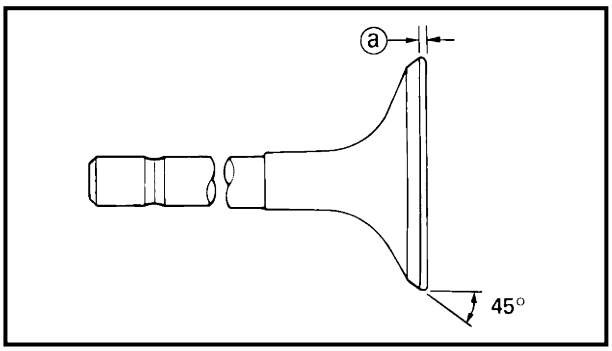


Valve guide remover
Intake (4.0 mm)
90890-04111
Exhaust (4.5 mm)
90890-04116
Valve guide installer
Intake (4.0 mm)
90890-04112
Exhaust (4.5 mm)
90890-04117
Valve guide reamer
Intake
90890-04113
Exhaust
90890-04118

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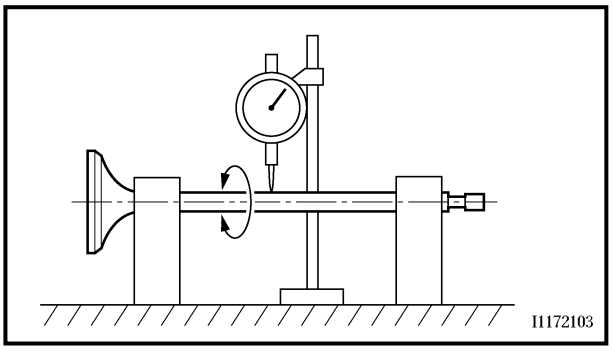
3. Eliminate:
 • carbon deposits
 (from the valve face and valve seat)

4. Check:
 • valve face
 Pitting/wear → Grind the valve face.
 • valve stem end
 Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.



5. Measure:
 • valve margin thickness ⓐ
 Out of specification → Replace the valve.

	Valve margin thickness **0.5 ~ 0.9 mm**



6. Measure:
 • valve stem runout
 Out of specification → Replace the valve.

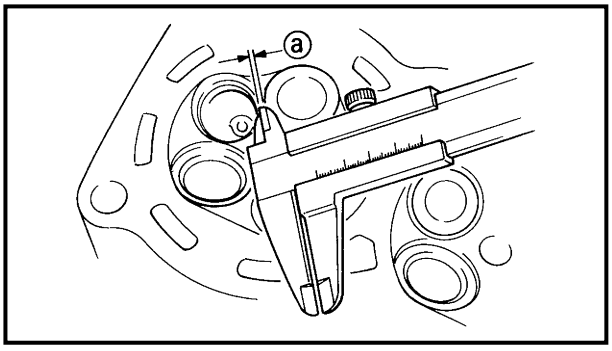
NOTE:
- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the oil seal.

	Valve stem runout **0.01 mm**

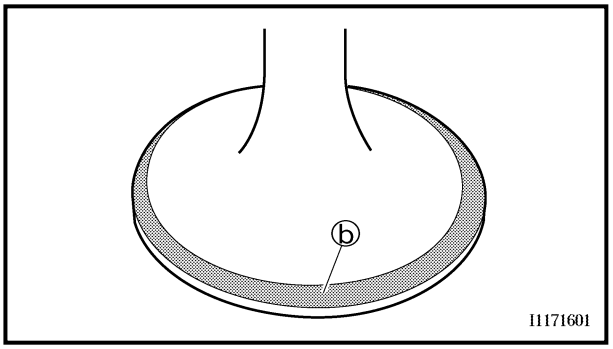
EB403410
CHECKING THE VALVE SEATS

The following procedure applies to all of the valves and valve seats.

1. Eliminate:
 • carbon deposits
 (from the valve face and valve seat)
2. Check:
 • valve seat
 Pitting/wear → Replace the cylinder head.
3. Measure:
 • valve seat width ⓐ
 Out of specification → Replace the cylinder head.



	Valve seat width **0.9 ~ 1.1 mm** **<Limit>: 1.6 mm**



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a. Apply Mechanic's blueing dye (Dykem) ⓑ onto the valve face.

b. Install the valve into the cylinder head.

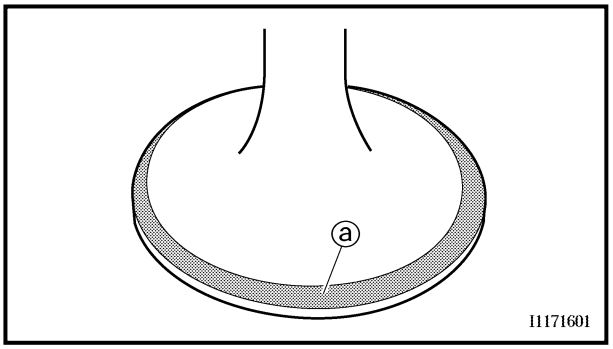
c. Press the valve through the valve guide and onto the valve seat to make a clear impression.

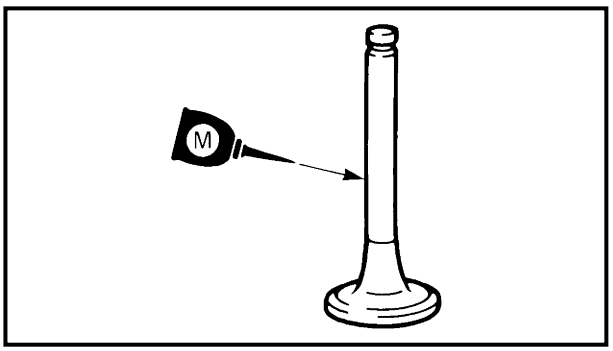
d. Measure the valve seat width.

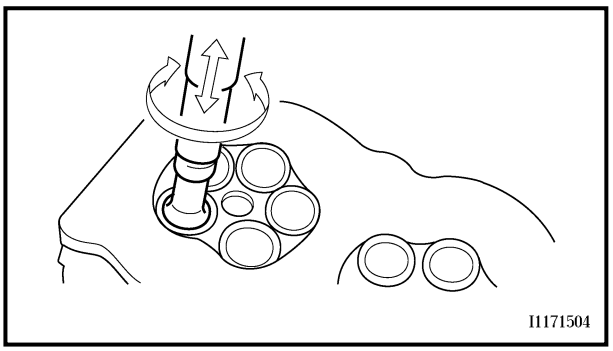
NOTE:

Where the valve seat and valve face contacted one another, the blueing will have been removed.

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4. Lap:
 - valve face
 - valve seat

NOTE:

After replacing the cylinder head or replacing the valve and valve guide, the valve seat and valve face should be lapped.

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a. Apply a coarse lapping compound ⓐ to the valve face.

CAUTION:

Do not let the lapping compound enter the gap between the valve stem and the valve guide.

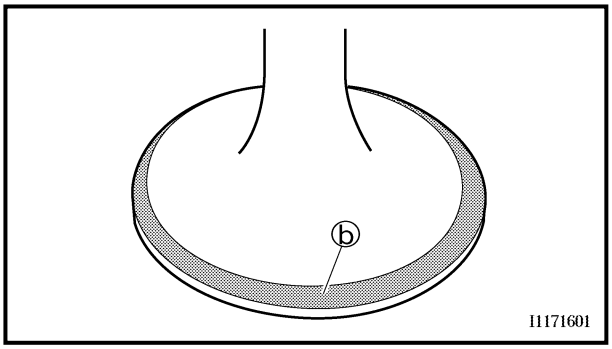
b. Apply molybdenum disulfide oil onto the valve stem.

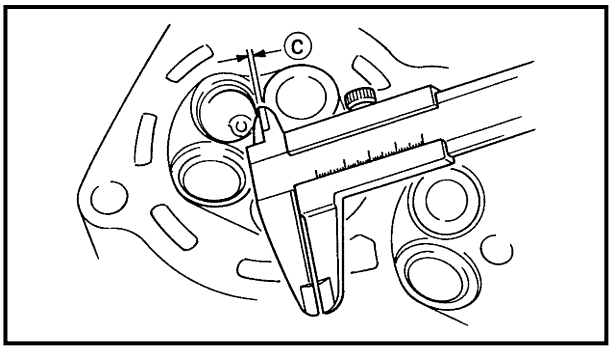
c. Install the valve into the cylinder head.

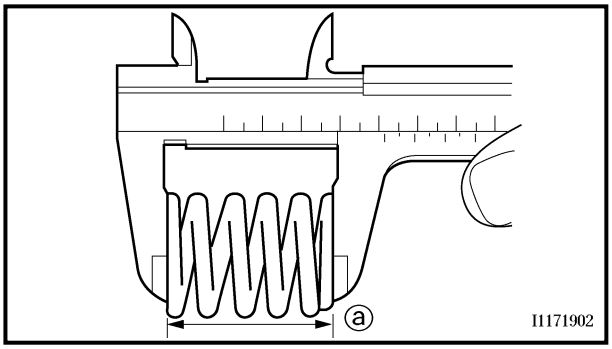
d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

NOTE:

For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.







e. Apply a fine lapping compound to the valve face and repeat the above steps.

f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.

g. Apply Mechanic's blueing dye (Dykem) ⓑ onto the valve face.

h. Install the valve into the cylinder head.

i. Press the valve through the valve guide and onto the valve seat to make a clear impression.

j. Measure the valve seat width ⓒ again. If the valve seat width is out of specification, reface and lap the valve seat.

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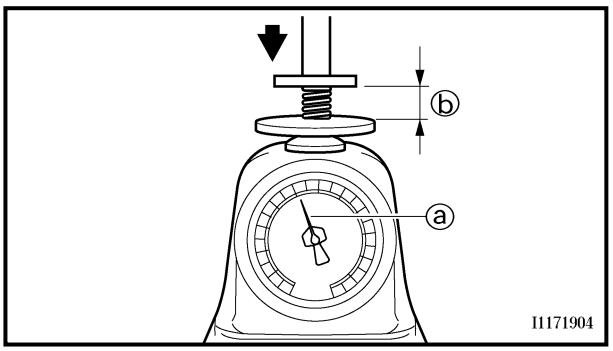
EB403420

CHECKING THE VALVE SPRINGS

The following procedure applies to all of the valve springs.

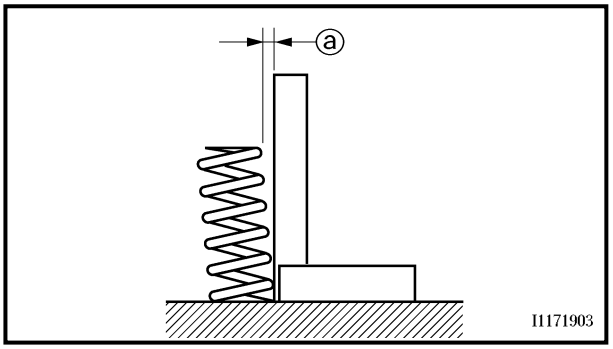
1. Measure:
 - valve spring free length ⓐ
 Out of specification → Replace the valve spring.

Valve spring free length
Intake valve spring
38.90 mm
<Limit>: 36.96 mm
Exhaust valve spring
40.67 mm
<Limit>: 38.64 mm



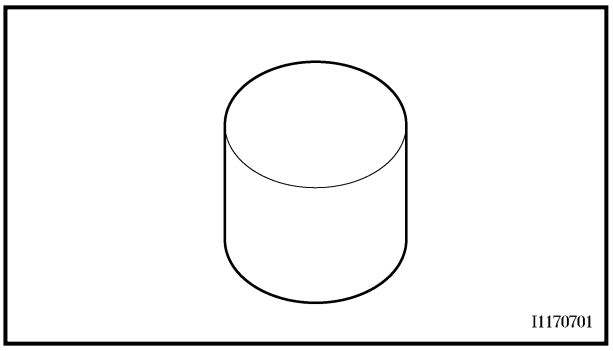
2. Measure:
 • compressed spring force ⓐ
 Out of specification → Replace the valve spring.
 ⓑ Installed length

Compressed spring force (installed)
Intake valve spring
8.36 ~ 9.79 kg at 34.5 mm
Exhaust valve spring
11.22 ~ 12.85 kg at 35.0 mm



3. Measure:
 • valve spring tilt ⓐ
 Out of specification → Replace the valve spring.

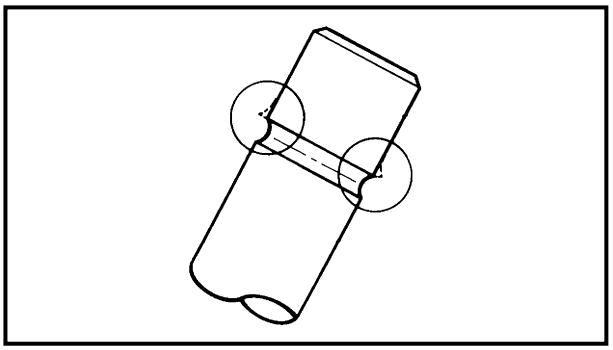
Max. spring tilt
Intake valve spring
1.7 mm
Exhaust valve spring
1.8 mm



EB403430
CHECKING THE VALVE LIFTERS

The following procedure applies to all of the valve lifters.

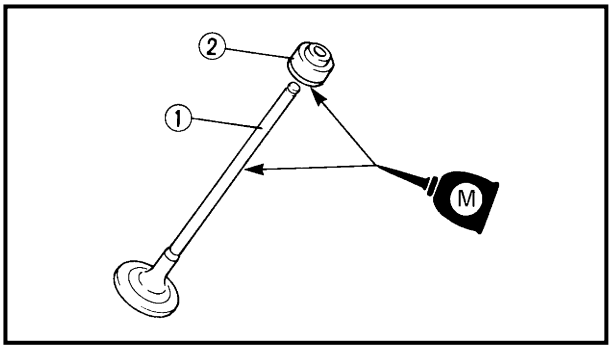
1. Check:
 • valve lifter
 Damage/scratches → Replace the valve lifters and cylinder head.



EB403702
INSTALLING THE VALVES

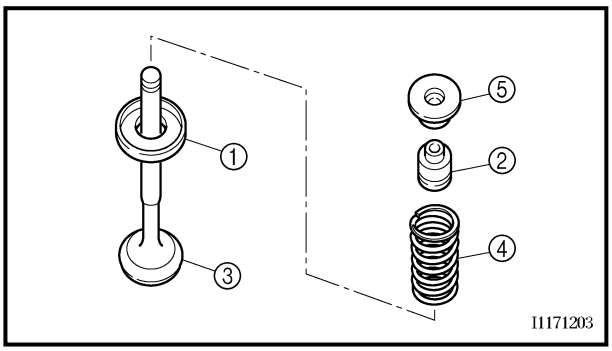
The following procedure applies to all of the valves and related components.

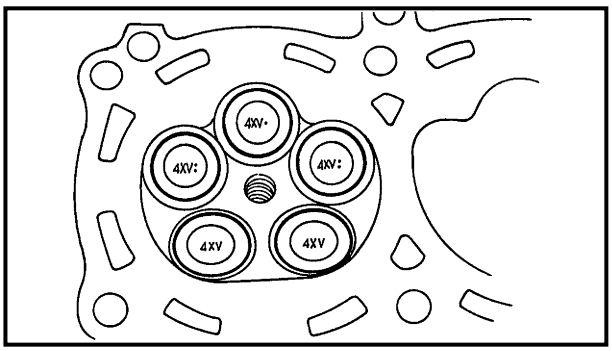
1. Deburr:
 • valve stem end
 (with an oil stone)

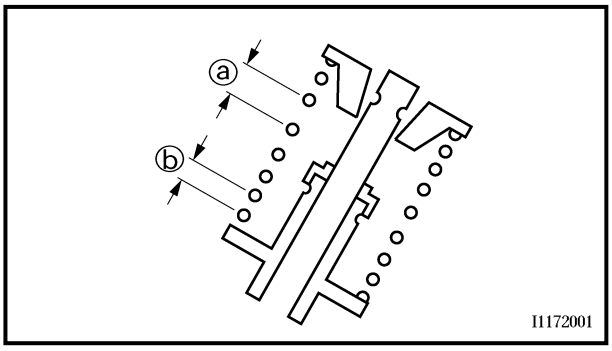


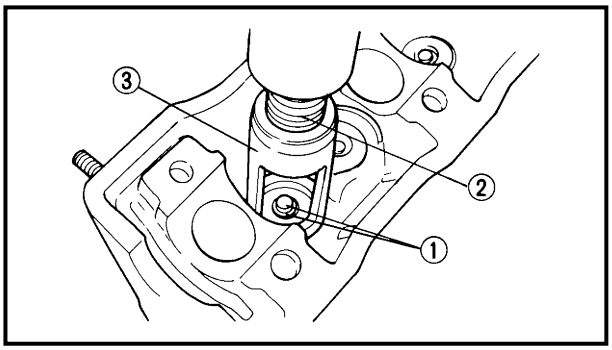
2. Lubricate:
 • valve stem ①
 • oil seal ②
 (with the recommended lubricant)

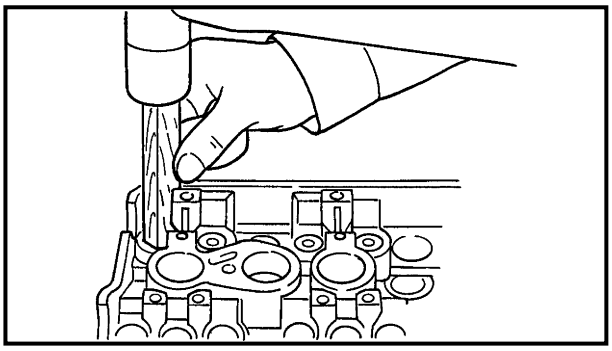
Recommended lubricant
Molybdenum disulfide oil











3. Install:
 - lower spring seat ①
 - oil seal ② New
 - valve ③
 - valve spring ④
 - upper spring seat ⑤

 (into the cylinder head)

NOTE:
- Make sure that each valve is installed in its original place. Refer to the following embossed marks.
 Right and left intake valve(-s): "4XV:"
 Middle intake valve(-s): "4XV."
 Exhaust valve(-s): "4XV"
- Install the valve spring with the larger pitch ⓐ facing up.

ⓑ Smaller pitch

4. Install:
 - valve cotters ①

NOTE:
Install the valve cotters by compressing the valve spring with the valve spring compressor ② and attachment ③.



Valve spring compressor
90890-04019
Attachment
(for the intake valve spring)
90890-04114
(for the exhaust valve spring)
90890-04108

5. To secure the valve cotters ① onto the valve stem, lightly tap the valve tip with a soft-face hammer.

CAUTION:
Hitting the valve tip with excessive force could damage the valve.

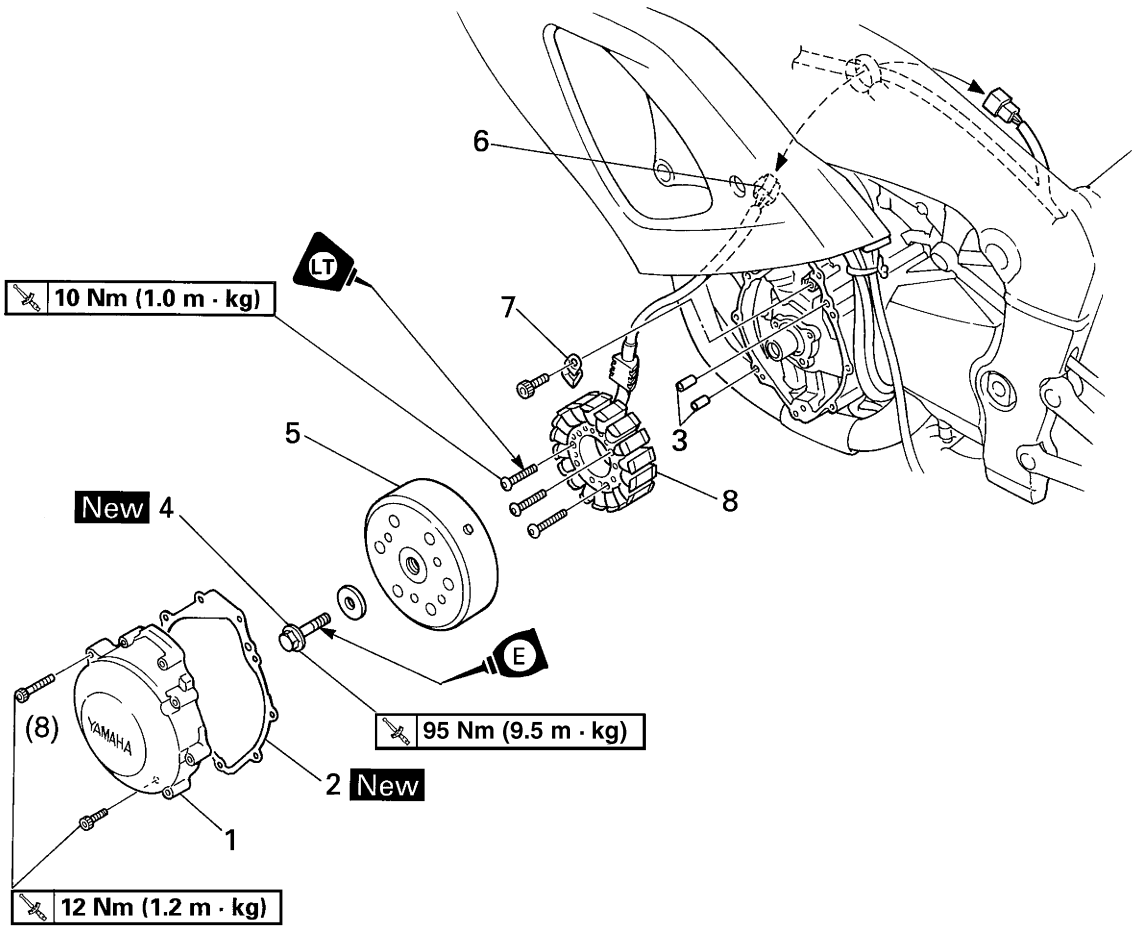
6. Lubricate:
 • valve pad
 (with the recommended lubricant)

	Recommended lubricant **Molybdenum disulfide oil**

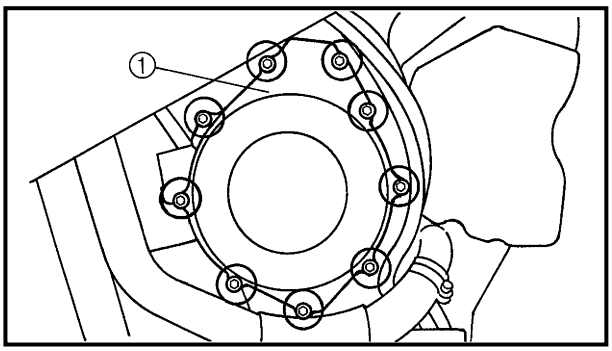
7. Install:
 • valve pad
 • valve lifter

NOTE:
- The valve lifter must move smoothly when rotated with a finger.
- Each valve lifter and valve pad must be reinstalled in its original position.

EB410000
GENERATOR



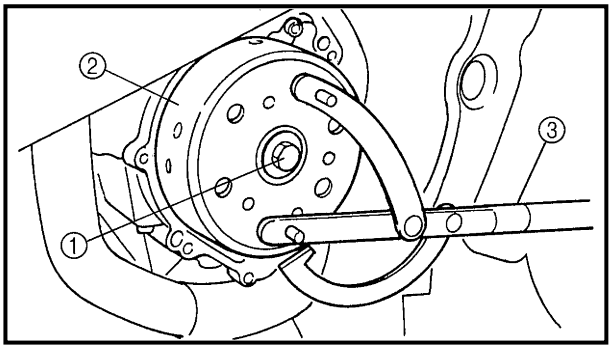
Order	Job/Part	Q'ty	Remarks
	Removing the stator coil assembly		Remove the parts in the order listed.
	Rider seat and fuel tank		Refer to "SEATS" and "FUEL TANK" in chapter 3.
	Bottom cowling		Refer to "COWLINGS" in chapter 3.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Generator rotor cover	1	
2	Generator rotor cover gasket	1	
3	Dowel pin	2	
4	Generator rotor bolt	1	
5	Generator rotor	1	
6	Stator coil assembly coupler	1	Disconnect.
7	Stator coil assembly lead holder	1	
8	Stator coil assembly	1	
			For installation, reverse the removal procedure.



EB410110
REMOVING THE GENERATOR

1. Remove:
 • generator rotor cover ①

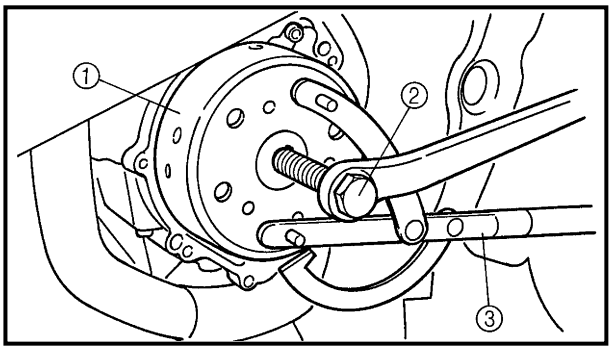
NOTE:
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.



2. Remove:
 • generator rotor bolt ①
 • washer

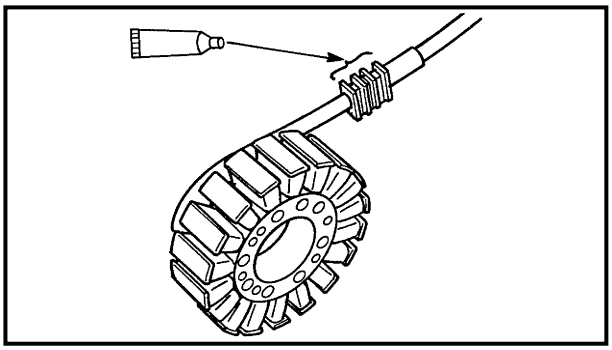
NOTE:
While holding the generator rotor ② with the rotor holding tool ③, loosen the generator rotor bolt.

	Rotor holding tool **90890-01235**



3. Remove:
 • generator rotor ①
 (with the flywheel puller ② and rotor holding tool ③)

	Flywheel puller **90890-01080**



EB410700
INSTALLING THE GENERATOR

1. Apply:
 • sealant
 (onto the stator coil assembly lead grommet)

	Yamaha bond No. 1215 **90890-85505**

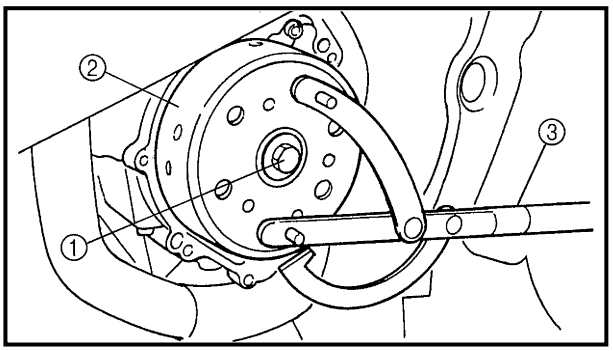
2. Install:
 • generator rotor
 • washer
 • generator rotor bolt

⚠ WARNING

Always use a new generator rotor bolt.

CAUTION:

- **Clean the tapered portion of the crankshaft and the generator rotor hub with lacquer thinner.**
- **Lubricate the generator rotor bolt threads with engine oil.**



3. Tighten:
 • generator rotor bolt ① New

	95 Nm (9.5 m · kg)

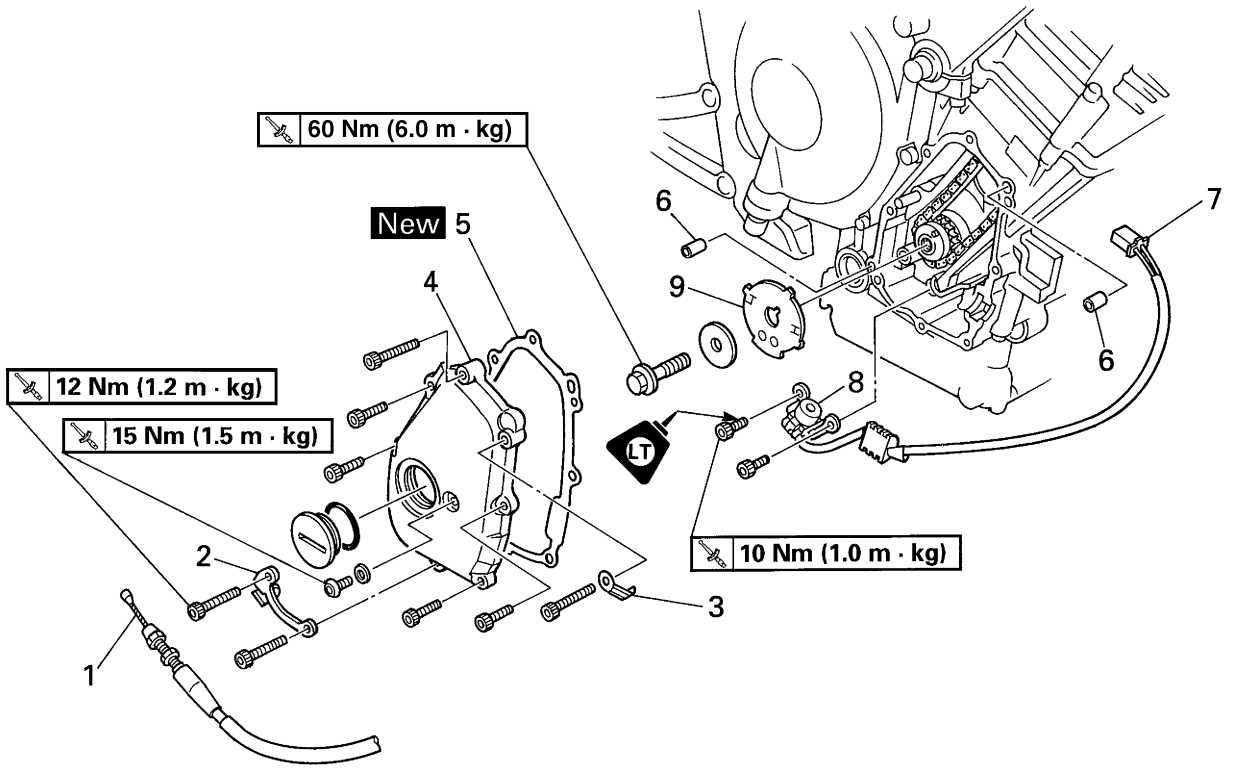
NOTE:
While holding the generator rotor ② with the rotor holding tool ③, tighten the generator rotor bolt.

	Rotor holding tool **90890-01235**

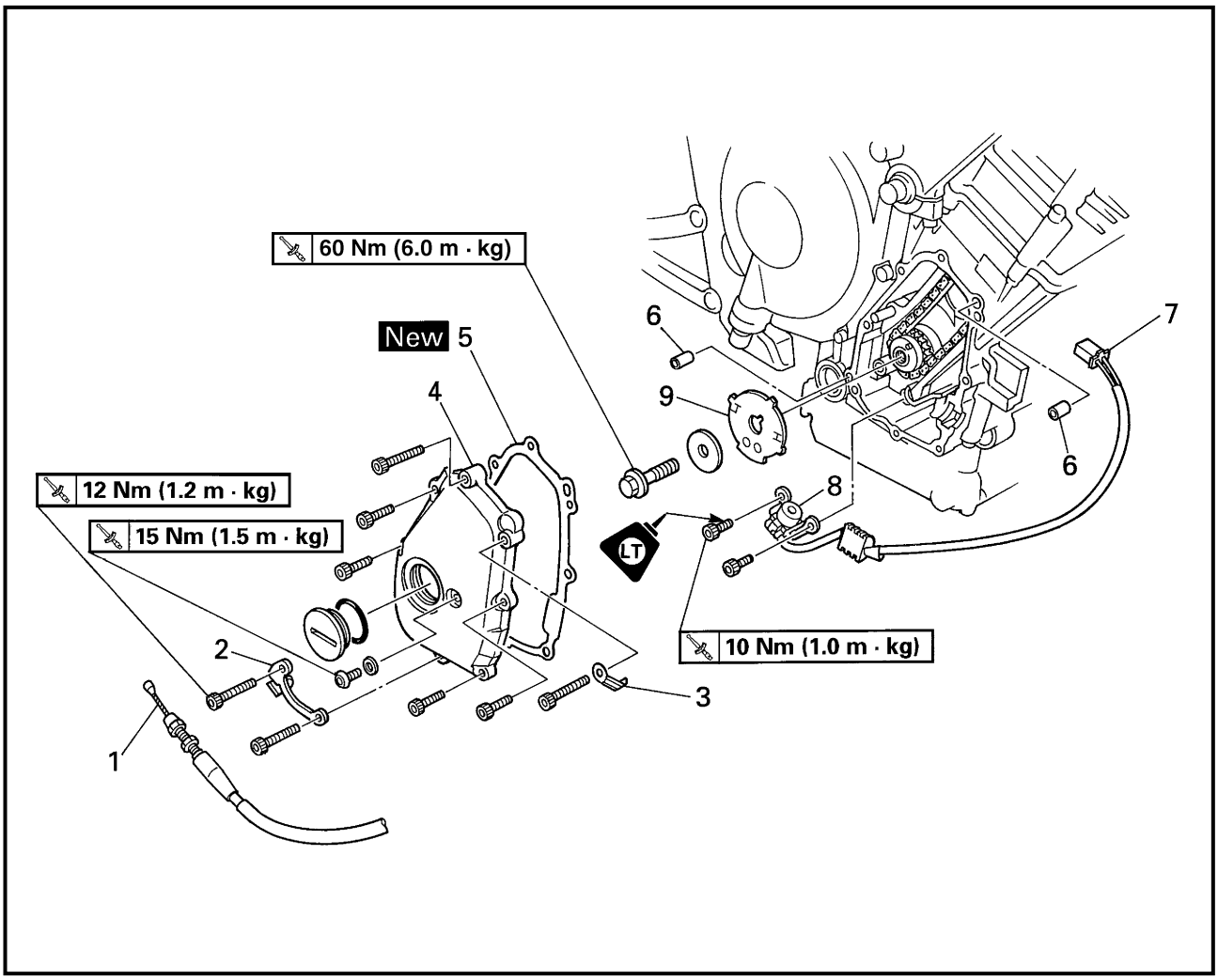
4. Install:
 • generator rotor cover

NOTE:
Tighten the generator rotor cover bolts in stages and in a crisscross pattern.

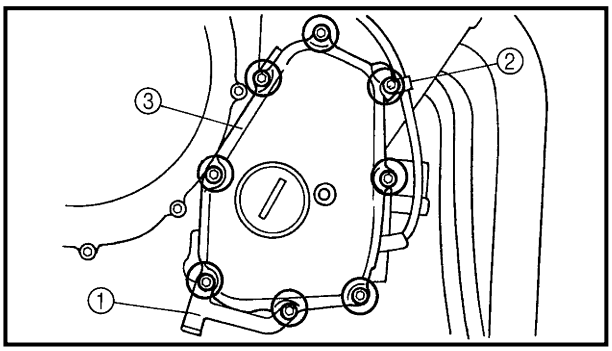
PICKUP COIL

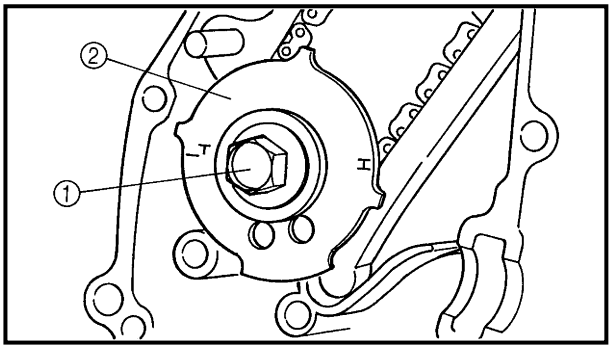


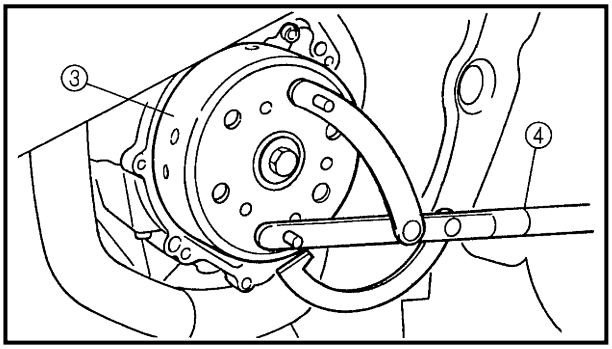
Order	Job/Part	Q'ty	Remarks
	Removing the pickup coil and pickup coil rotor		Remove the parts in the order listed.
	Rider seat and fuel tank		Refer to "SEATS" and "FUEL TANK" in chapter 3.
	Bottom cowling and right side cowling		Refer to "COWLINGS" in chapter 3.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Generator rotor cover		Refer to "GENERATOR".
1	Clutch cable	1	
2	Clutch cable holder	1	
3	Pickup coil lead holder	1	
4	Pickup coil rotor cover	1	
5	Pickup coil rotor cover gasket	1	
6	Dowel pin	2	

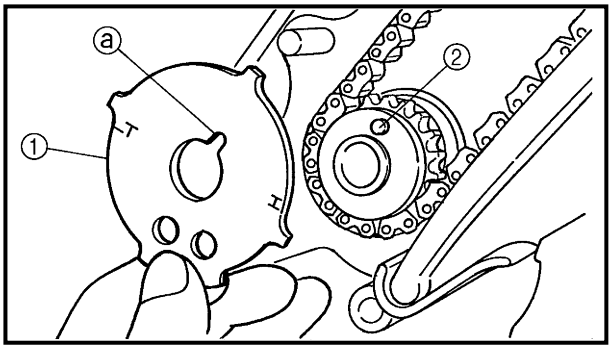


Order	Job/Part	Q'ty	Remarks
7	Pickup coil coupler	1	Disconnect.
8	Pickup coil	1	
9	Pickup coil rotor	1	
			For installation, reverse the removal procedure.









REMOVING THE PICKUP COIL ROTOR

1. Remove:
 - clutch cable holder ①
 - pickup coil lead holder ②
 - pickup coil rotor cover ③

NOTE:
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.

2. Remove:
 - pickup coil rotor bolt ①
 - washer
 - pickup coil rotor ②

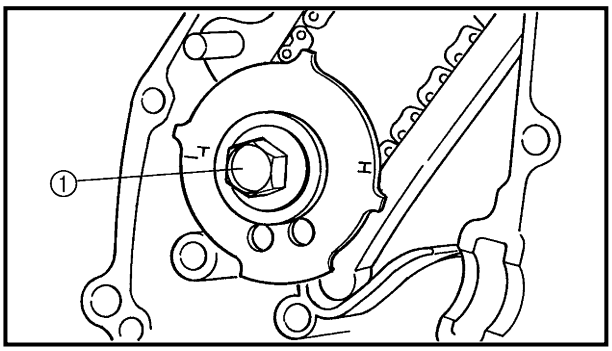
NOTE:
While holding the generator rotor ③ with the rotor holding tool ④, loosen the pickup coil rotor bolt.

	Rotor holding tool **90890-01235**

INSTALLING THE PICKUP COIL ROTOR

1. Install:
 - pickup coil rotor ①
 - washer
 - pickup coil rotor bolt

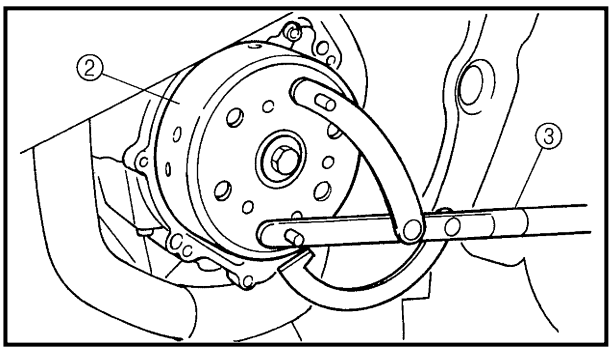
NOTE:
When installing the pickup coil rotor, align the pin ② in the crankshaft sprocket with the groove ⓐ in the pickup coil rotor.



2. Tighten:
 • pickup coil rotor bolt ①

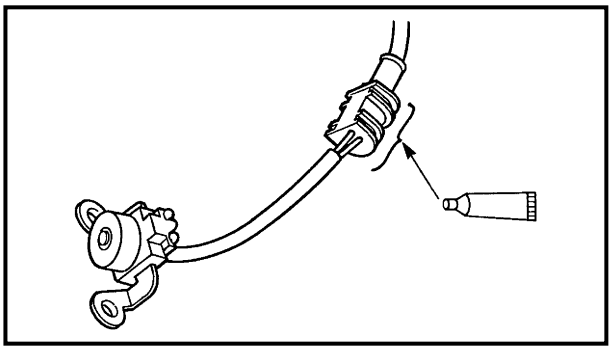
60 Nm (6.0 m · kg)

NOTE:
While holding the generator rotor ② with the rotor holding tool ③, tighten the pickup coil rotor bolt.





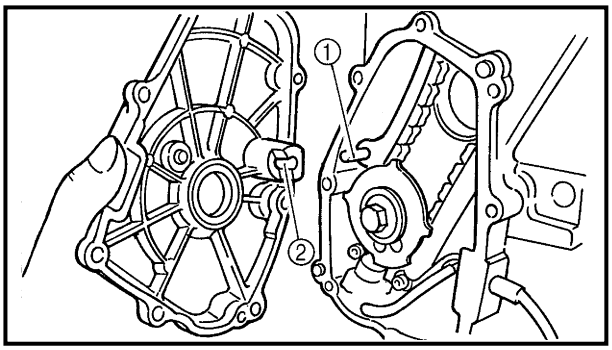
Rotor holding tool
90890-01235



3. Apply:
 • sealant
 (onto the pickup coil lead grommet)



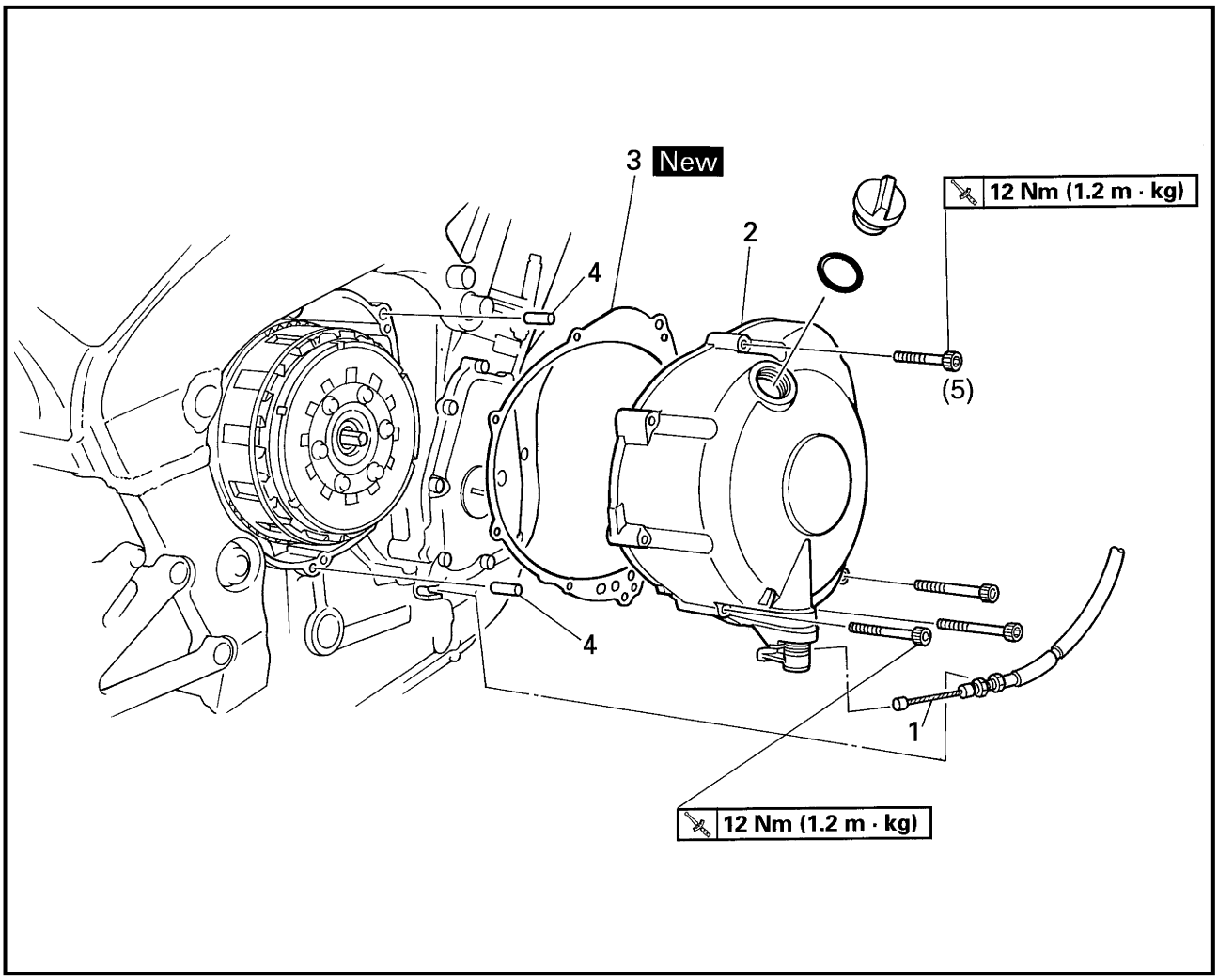
Yamaha bond No. 1215
90890-85505



4. Install:
 • pickup coil rotor cover
 • pickup coil lead holder
 • clutch cable holder

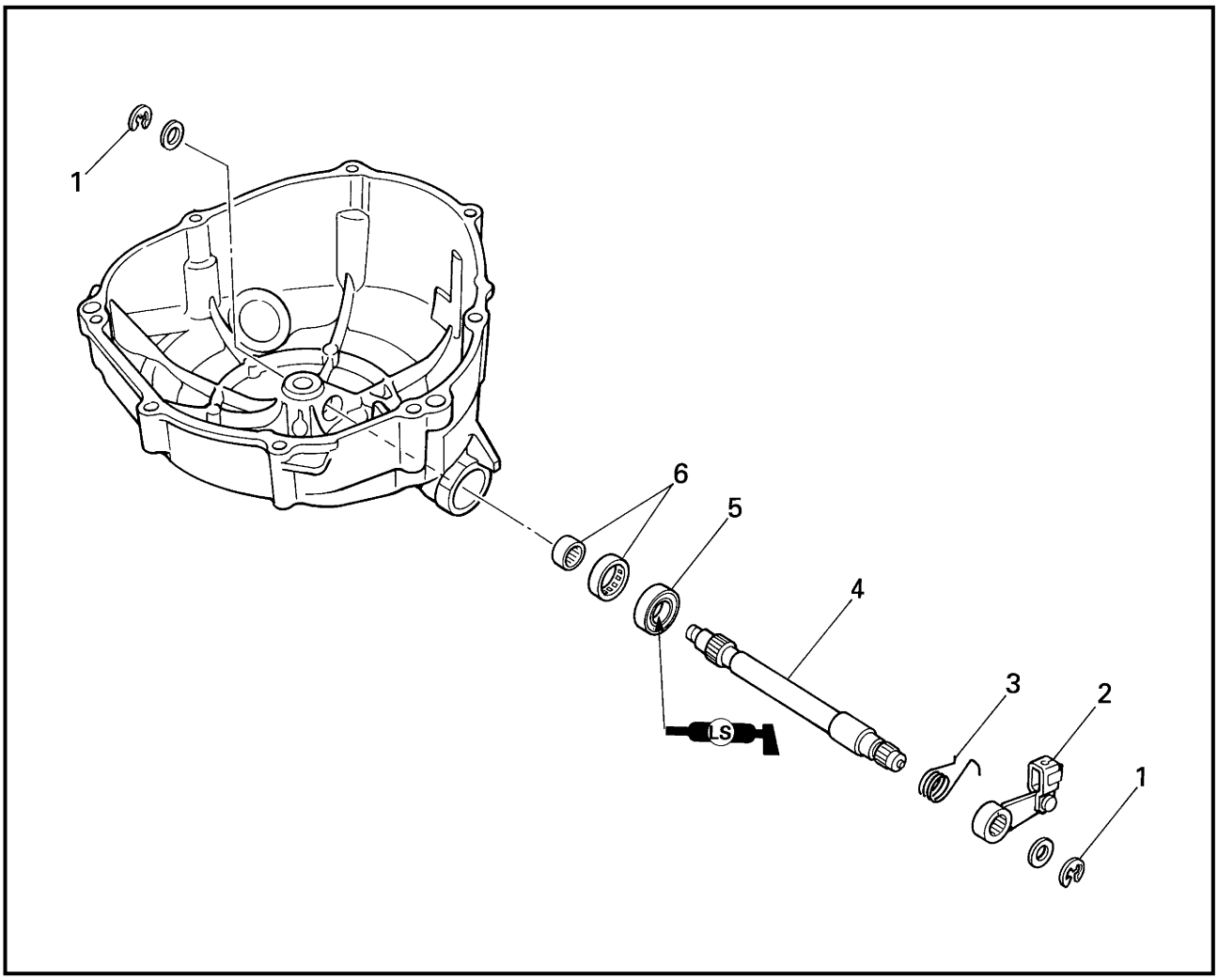
NOTE:
- When installing the pickup coil rotor cover, align the timing chain guide (intake side) pin ① of the with the hole ② in the pickup coil rotor cover.
- Tighten the pickup coil rotor cover bolts in stages and in a crisscross pattern.

EB405000
CLUTCH

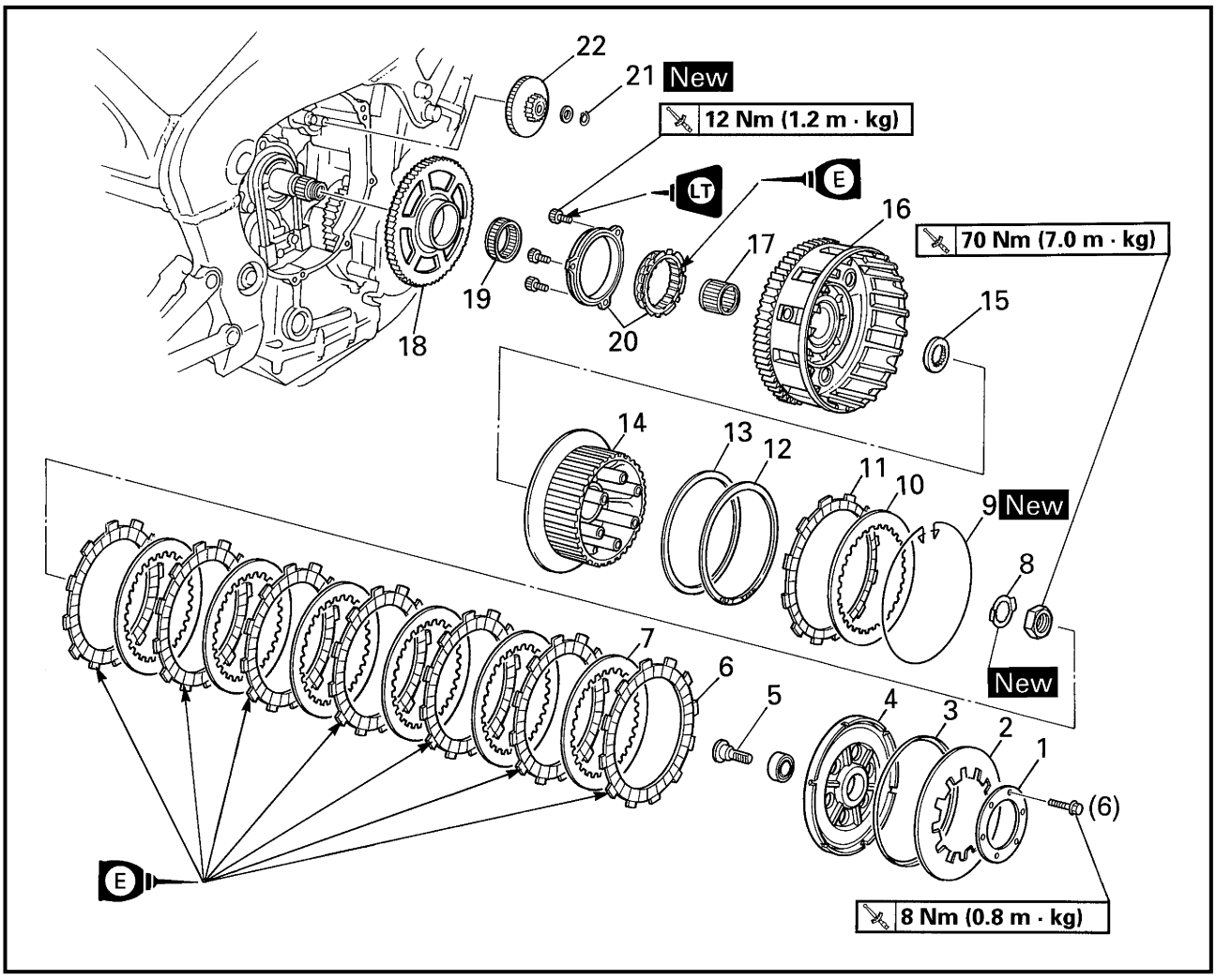


Order	Job/Part	Q'ty	Remarks
	Removing the clutch cover		Remove the parts in the order listed.
	Bottom cowling and right side cowling		Refer to "COWLINGS" in chapter 3.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Clutch cable	1	
2	Clutch cover	1	
3	Clutch cover gasket	1	
4	Dowel pin	2	
			For installation, reverse the removal procedure.

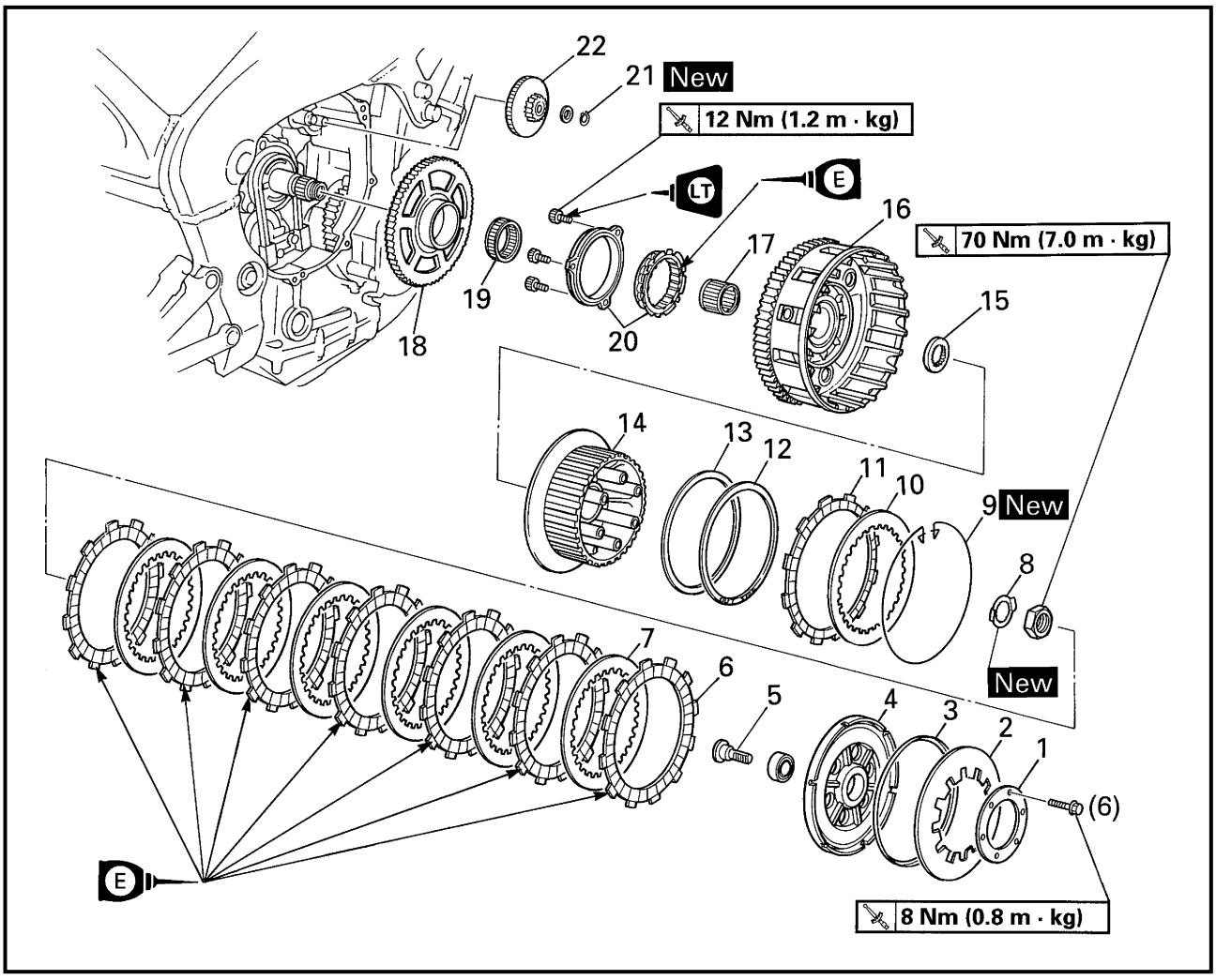
EB405010



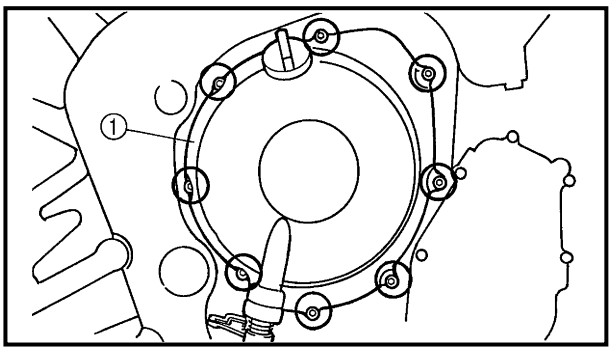
Order	Job/Part	Q'ty	Remarks
	Removing the pull lever shaft		Remove the parts in the order listed.
1	Circlip	2	
2	Pull lever	1	
3	Pull lever spring	1	
4	Pull lever shaft	1	
5	Oil seal	1	
6	Bearing	2	
			For installation, reverse the removal procedure.

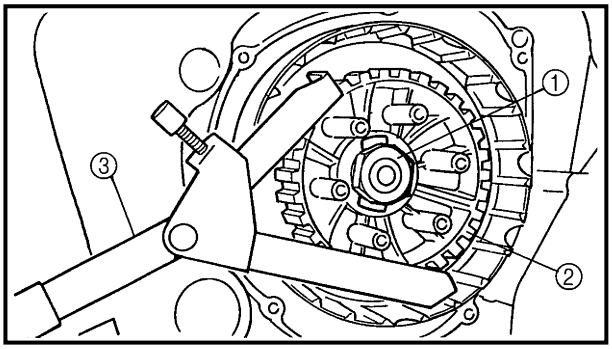


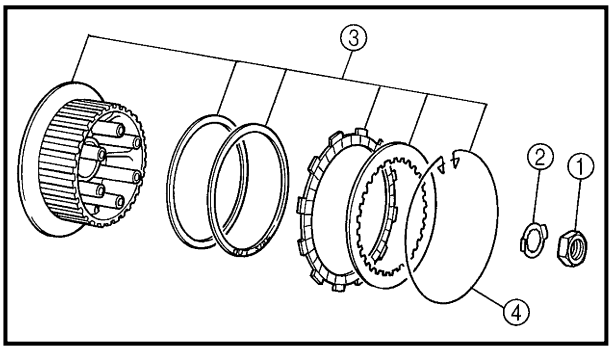
Order	Job/Part	Q'ty	Remarks
	Removing the clutch		Remove the parts in the order listed.
1	Clutch spring plate retainer	1	
2	Clutch spring plate	1	
3	Clutch spring plate seat	1	
4	Pressure plate	1	
5	Pull rod	1	
6	Friction plate	7	Inside diameter =124 mm
7	Clutch plate	6	
8	Lock washer	1	
9	Wire circlip	1	
10	Clutch plate	1	
11	Friction plate	1	Inside diameter =135 mm
12	Clutch damper spring	1	
13	Clutch damper spring seat	1	
14	Clutch boss	1	

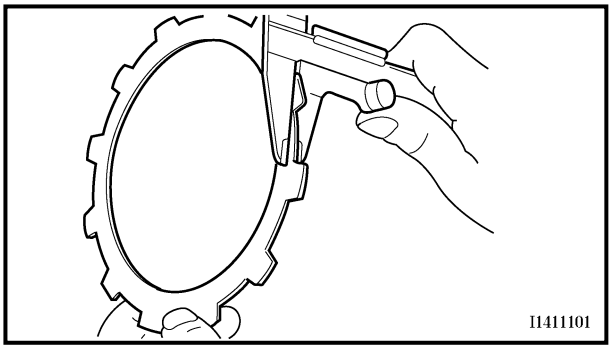


Order	Job/Part	Q'ty	Remarks
15	Thrust washer	1	
16	Clutch housing	1	
17	Bearing	1	
18	Starter clutch gear	1	
19	Bearing	1	
20	Starter clutch assembly	1	
21	Circlip	1	
22	Starter clutch idle gear	1	
			For installation, reverse the removal procedure.









EB405102
REMOVING THE CLUTCH

1. Remove:
 • clutch cover ①

NOTE:
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.

2. Straighten the lock washer tab.
3. Loosen:
 • clutch boss nut ①

NOTE:
While holding the clutch boss ② with the clutch holding tool ③, loosen the clutch boss nut.

Clutch holding tool
90890-04086

4. Remove:
 • clutch boss nut ①
 • lock washer ②
 • clutch boss assembly ③

NOTE:
There is a built-in damper between the clutch boss and the friction plate. It is not necessary to remove the wire circlip ④ and disassemble the built-in damper unless there is serious clutch chattering.

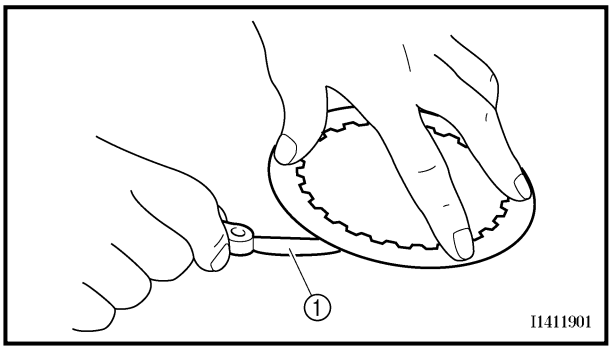
EB405400
CHECKING THE FRICTION PLATES

The following procedure applies to all of the friction plates.

1. Check:
 • friction plate
 Damage/wear → Replace the friction plates as a set.
2. Measure:
 • friction plate thickness
 Out of specification → Replace the friction plates as a set.

NOTE:
Measure the friction plate at four places.

Friction plate thickness
2.9 ~ 3.1 mm
<Limit>: 2.8 mm



EB405410
CHECKING THE CLUTCH PLATES

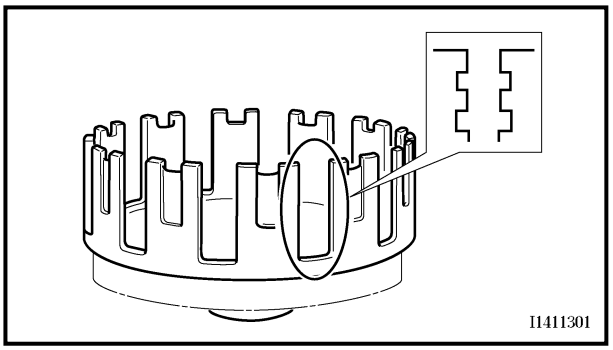
The following procedure applies to all of the clutch plates.

1. Check:
 • clutch plate
 Damage → Replace the clutch plates as a set.
2. Measure:
 • clutch plate warpage
 (with a surface plate and thickness gauge ①)
 Out of specification → Replace the clutch plates as a set.

Max. clutch plate warpage
0.1 mm

EB405430
CHECKING THE CLUTCH SPRING PLATE

1. Check:
 • clutch spring plate
 Damage → Replace.
2. Check:
 • clutch spring plate seat
 Damage → Replace.

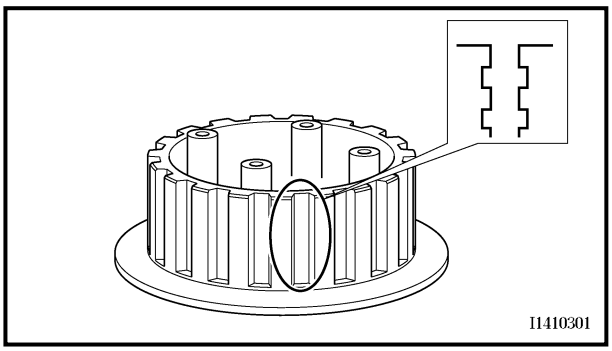


EB405440
CHECKING THE CLUTCH HOUSING

1. Check:
 • clutch housing dogs
 Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

NOTE:
Pitting on the clutch housing dogs will cause erratic clutch operation.

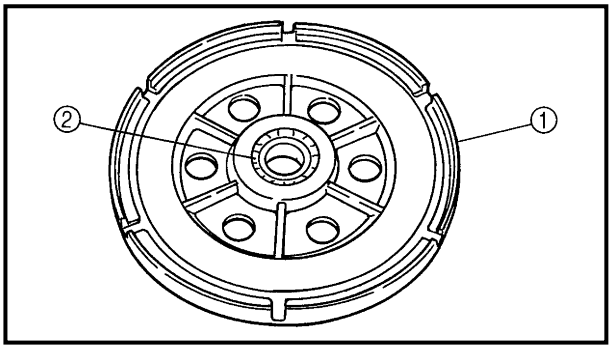
2. Check:
 • bearing
 Damage/wear → Replace the clutch housing.



EB405450
CHECKING THE CLUTCH BOSS

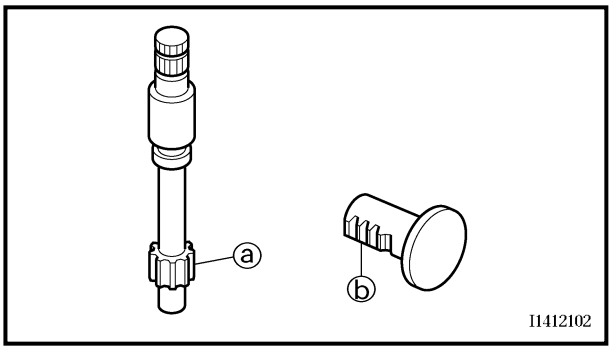
1. Check:
 - clutch boss splines
 Damage/pitting/wear → Replace the clutch boss.

NOTE:
Pitting on the clutch boss splines will cause erratic clutch operation.



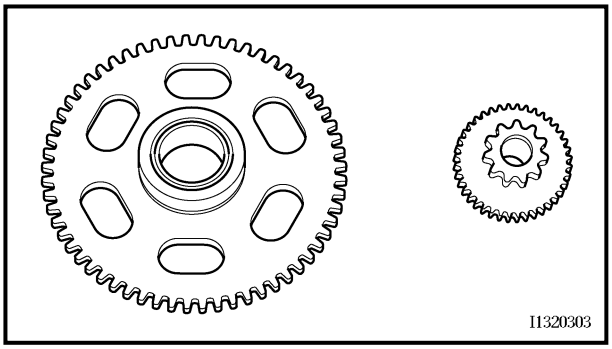
EB405460
CHECKING THE PRESSURE PLATE

1. Check:
 - pressure plate ①
 Cracks/damage → Replace.
 - bearing ②
 Damage/wear → Replace.



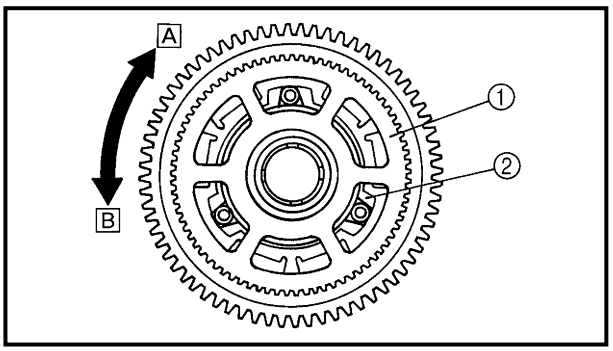
EB405470
CHECKING THE PULL LEVER SHAFT AND PULL ROD

1. Check:
 - pull lever shaft pinion gear teeth ⓐ
 - pull rod teeth ⓑ
 Damage/wear → Replace the pull rod and pull lever shaft as a set.
2. Check:
 - pull rod bearing
 Damage/wear → Replace.



CHECKING THE STARTER CLUTCH

1. Check:
 - starter clutch gear
 - starter clutch idle gear
 Chips/pitting/roughness/wear → Replace the defective part(-s).



2. Check:
 • starter clutch operation

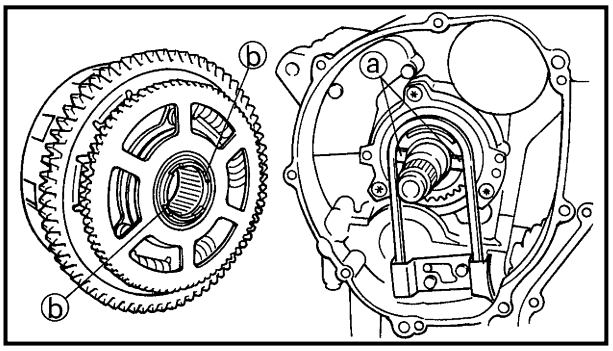
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a. Install the starter clutch gear ① onto the starter clutch ② and hold the starter clutch.

b. When turning the starter clutch gear clockwise [A], the starter clutch and the starter clutch gear should engage, otherwise the starter clutch is faulty and must be replaced.

c. When turning the starter clutch gear counterclockwise [B], it should turn freely, otherwise the starter clutch is faulty and must be replaced.

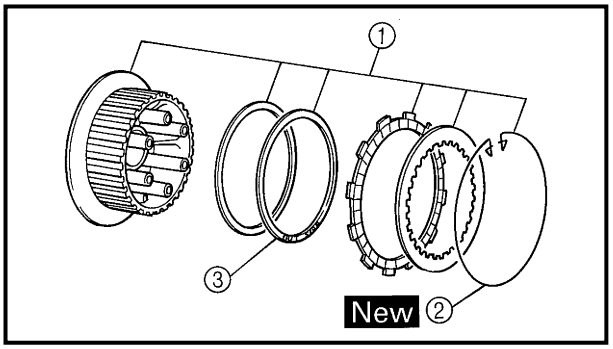
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EB405703
INSTALLING THE CLUTCH

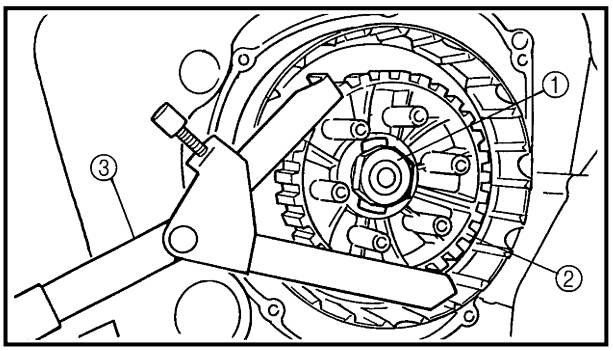
1. Install:
 • clutch housing

NOTE:
- Make sure that the slots ⓐ in the clutch housing align with the tabs ⓑ on the oil/water pump assembly drive sprocket.
- Make sure that the primary driven gear teeth and primary drive gear teeth mesh correctly.
- Make sure that the starter clutch gear teeth and starter clutch idle gear teeth mesh correctly.



2. Install:
 • clutch boss assembly ①

NOTE:
- If the wire circlip ② has been removed, carefully install a new one.
- Install the clutch damper spring ③ with the “OUTSIDE” mark facing out.



3. Install:
 • lock washer New
 • clutch boss nut ① 70 Nm (7.0 m · kg)

NOTE:
While holding the clutch boss ② with the clutch holding tool ③, tighten the clutch boss nut.

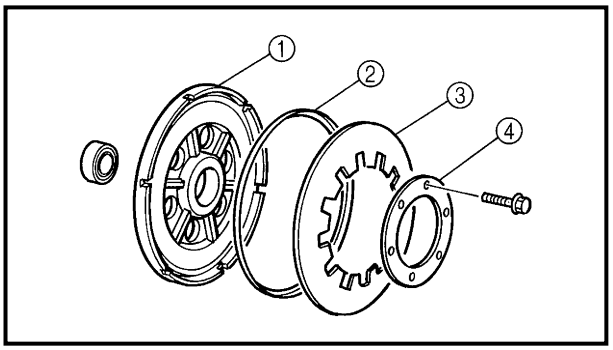
Clutch holding tool
90890-04086

4. Bend the lock washer tab along a flat side of the nut.
5. Lubricate:
 • friction plates
 • clutch plates
 (with the recommended lubricant)

Recommended lubricant
Engine oil

6. Install:
 • friction plates
 • clutch plates

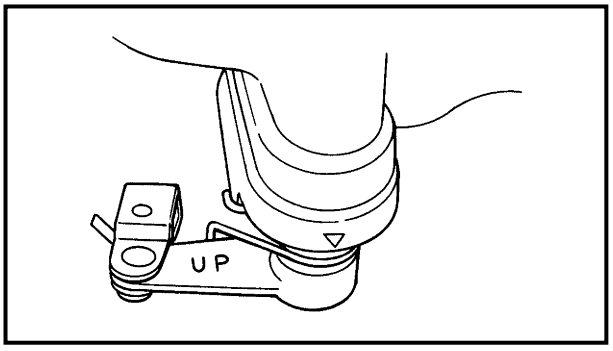
NOTE:
First, install a friction plate and then alternate between a clutch plate and a friction plate.



7. Install:
 • pressure plate ①
 • clutch spring plate seat ②
 • clutch spring plate ③
 • clutch spring plate retainer ④

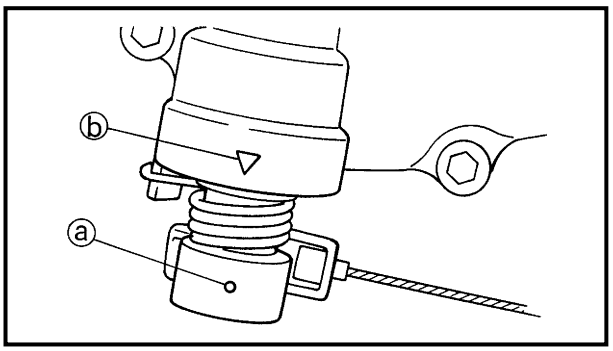
8 Nm (0.8 m · kg)

NOTE:
Tighten the clutch spring plate retainer bolts in stages and in a crisscross pattern.



8. Install:
 • pull lever

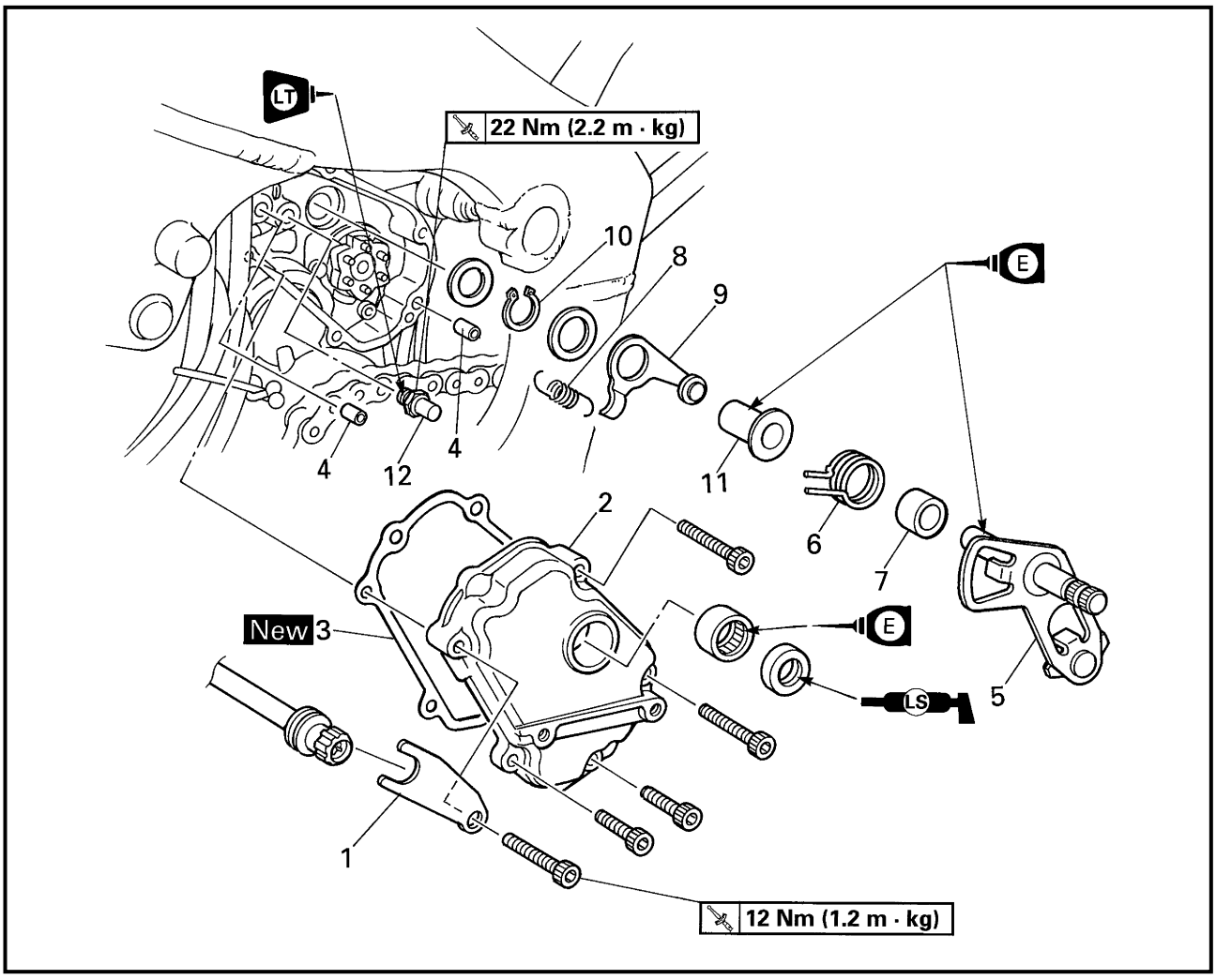
NOTE:
Install the pull lever with the “UP” mark facing towards the clutch cover.



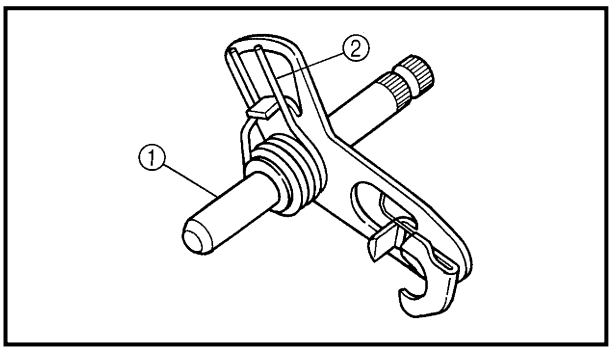
9. Install:
 • clutch cover — **12 Nm (1.2 m · kg)**

NOTE:
- When installing the clutch cover, push the pull lever and check that the punch mark ⓐ on the pull lever aligns with the mark ⓑ on the clutch cover. Make sure that the pull rod teeth and pull lever shaft pinion gear are engaged.
- Tighten the clutch cover bolts in stages and in a crisscross pattern.

EB408000
SHIFT SHAFT

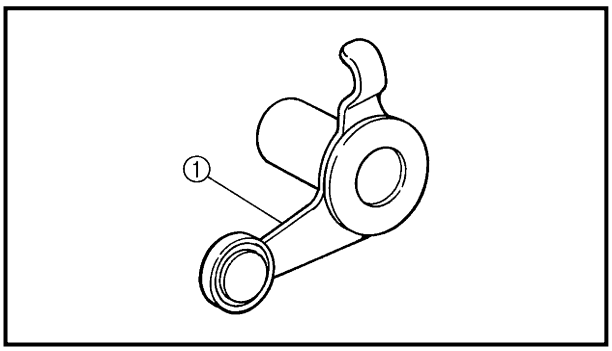


Order	Job/Part	Q'ty	Remarks
	Removing the shift shaft and stopper lever		Remove the parts in the order listed.
	Drive sprocket cover		Refer to "ENGINE".
1	Throttle stop screw holder	1	
2	Shift shaft cover	1	
3	Shift shaft cover gasket	1	
4	Dowel pin	2	
5	Shift shaft	1	
6	Shift shaft spring	1	
7	Spacer	1	
8	Stopper lever spring	1	
9	Stopper lever	1	
10	Circlip	1	
11	Collar	1	
12	Shift shaft spring stopper	1	
			For installation, reverse the removal procedure.



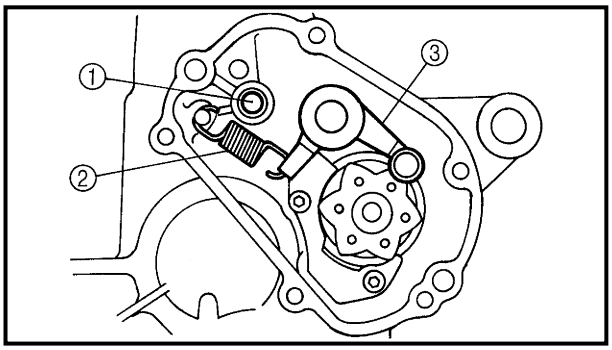
EB408401
CHECKING THE SHIFT SHAFT

1. Check:
 - shift shaft ①
 Bends/damage/wear → Replace.
 - shift shaft spring ②
 Damage/wear → Replace.



EB408410
CHECKING THE STOPPER LEVER

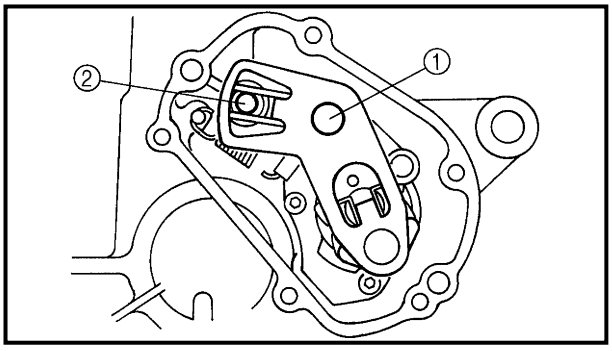
1. Check:
 - stopper lever ①
 Bends/damage → Replace.
 Roller turns roughly → Replace the stopper lever.



EB408703
INSTALLING THE SHIFT SHAFT

1. Install:
 - shift shaft spring stopper ①
 22 Nm (2.2 m · kg)
 - stopper lever spring ②
 - stopper lever ③

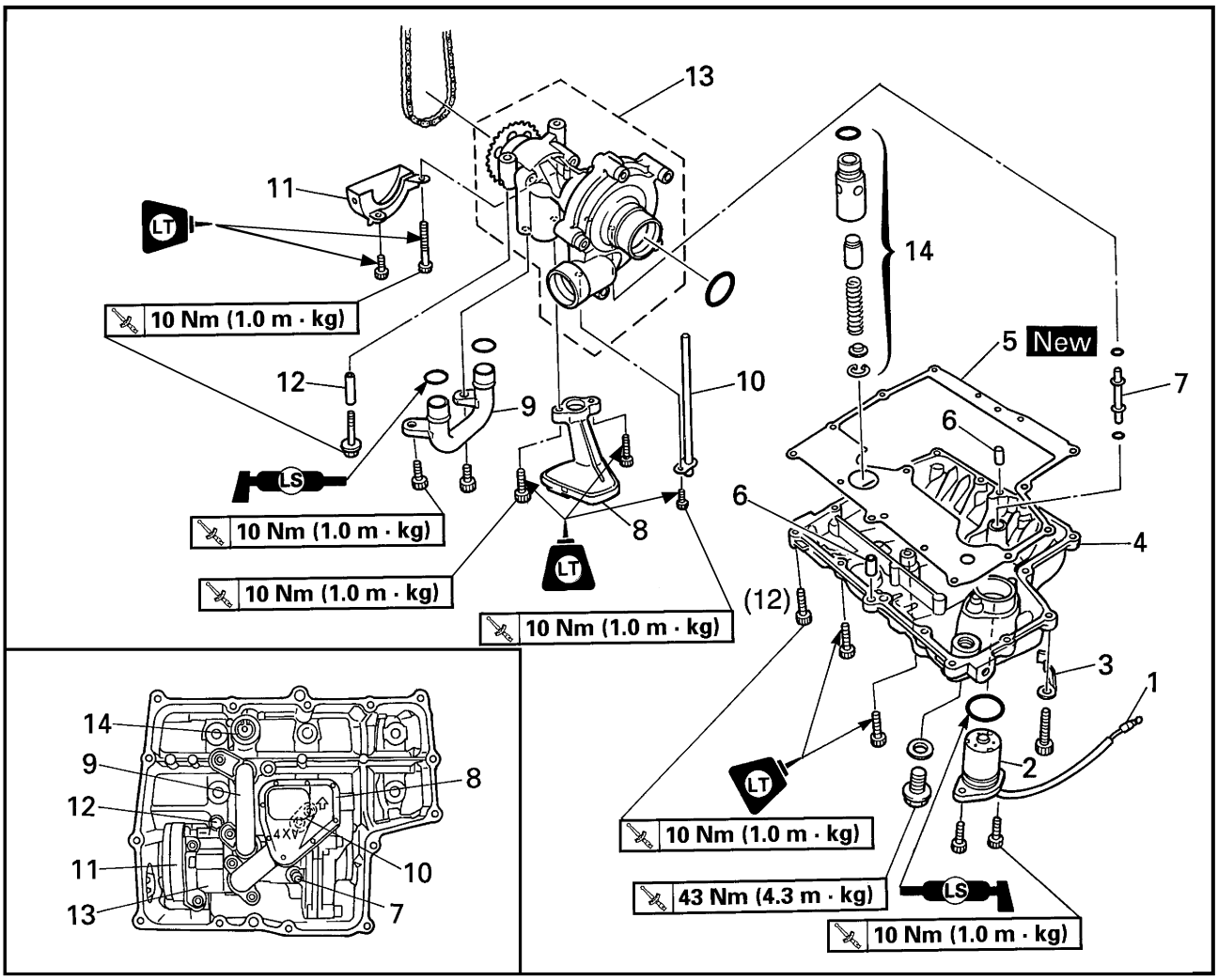
NOTE:
- Apply LOCTITE® to the threads of the shift shaft spring stopper.
- Hook the ends of the stopper lever spring onto the stopper lever and the crankcase boss.
- Mesh the stopper lever with the shift drum segment assembly.



2. Install:
 - shift shaft ①
 - spacer

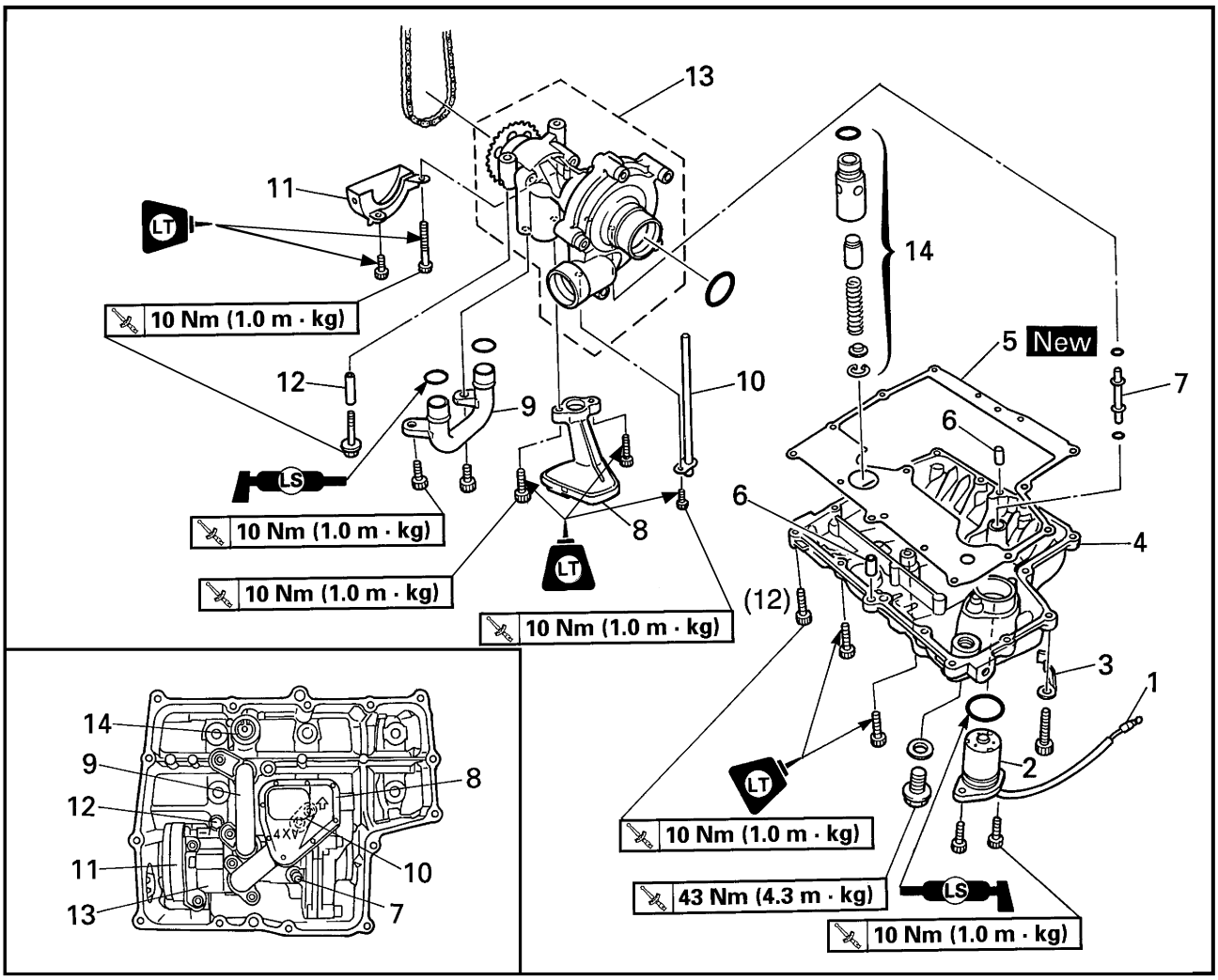
NOTE:
- Lubricate the oil seal lips with lithium soap base grease.
- Install the end of the shift shaft spring onto the shift shaft spring stopper ②.

EB411000
OIL PAN AND OIL PUMP



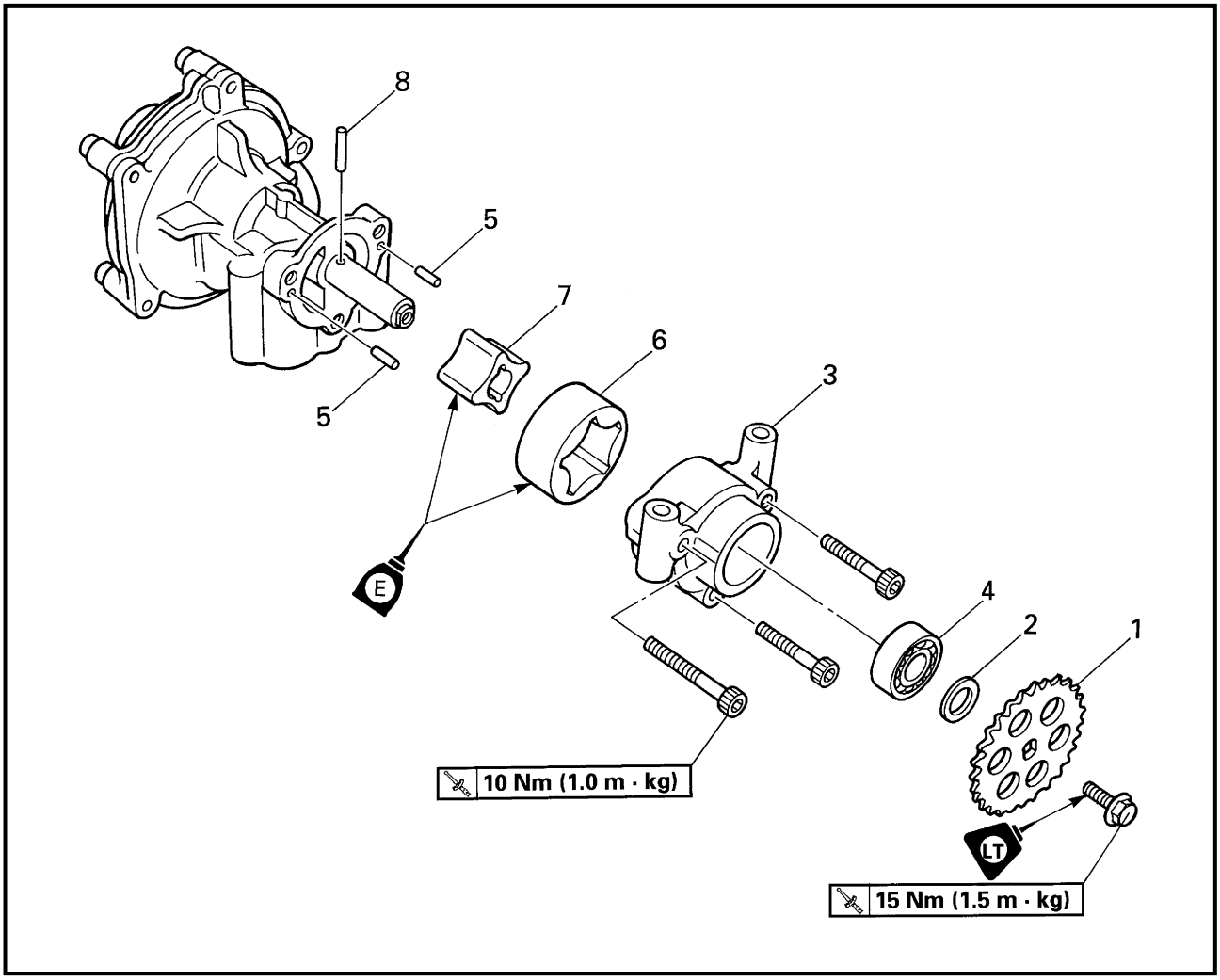
Order	Job/Part	Q'ty	Remarks
	Removing the oil pan and oil pump		Remove the parts in the order listed.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
	Radiator assembly and water pump outlet pipe		Refer to "RADIATOR" and "OIL COOLER" in chapter 5.
	Exhaust pipe assembly		Refer to "ENGINE".
1	Oil level switch connector	1	Disconnect.
2	Oil level switch	1	
3	Oil level switch lead holder	1	
4	Oil pan	1	
5	Oil pan gasket	1	
6	Dowel pin	2	

EB411001

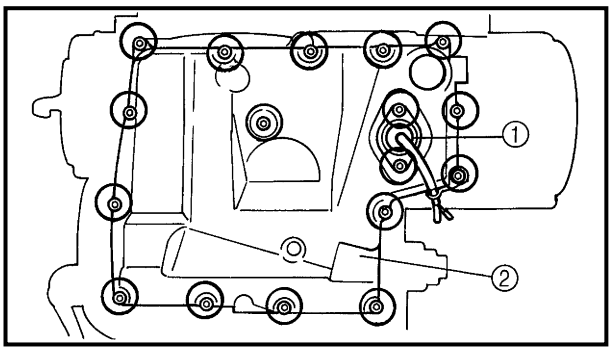


Order	Job/Part	Q'ty	Remarks
7	Drain pipe	1	
8	Oil strainer	1	
9	Oil pipe	1	
10	Oil delivery pipe	1	
11	Oil/water pump assembly drive sprocket cover	1	
12	Dowel pin	1	
13	Oil/water pump assembly	1	
14	Relief valve assembly	1	
			For installation, reverse the removal procedure.

EB411003



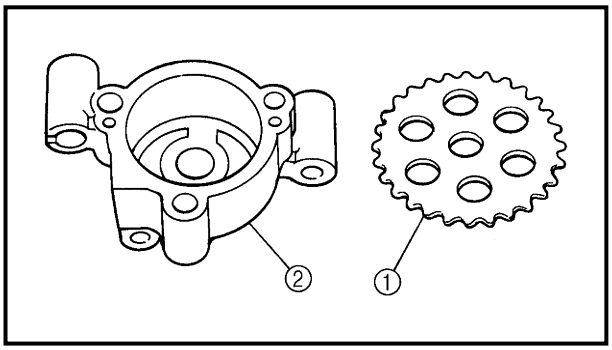
Order	Job/Part	Q'ty	Remarks
	Removing the oil pump		Remove the parts in the order listed.
1	Oil/water pump assembly driven sprocket	1	
2	Washer	1	
3	Oil pump housing	1	
4	Bearing	1	
5	Pin	2	
6	Oil pump outer rotor	1	
7	Oil pump inner rotor	1	
8	Pin	1	
			For installation, reverse the removal procedure.



EB411100
REMOVING THE OIL PAN

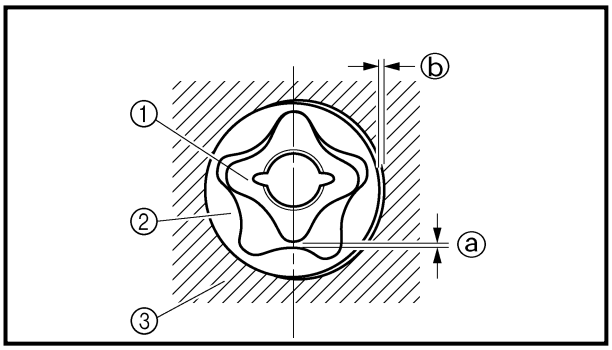
1. Remove:
 - oil level switch ①
 - oil pan ②
 - oil pan gasket
 - dowel pins

NOTE:
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.



EB411400
CHECKING THE OIL PUMP

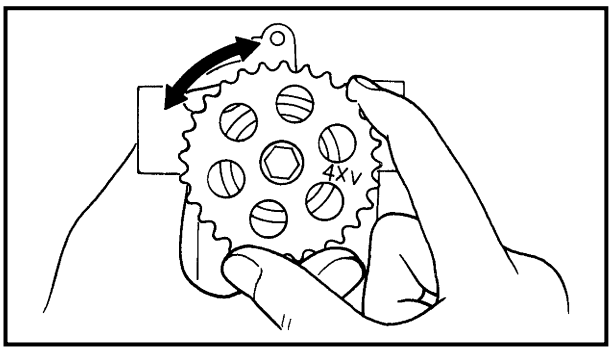
1. Check:
 - oil/water pump assembly driven sprocket ①
 - oil pump housing ②
 Cracks/damage/wear → Replace the defective part(-s).



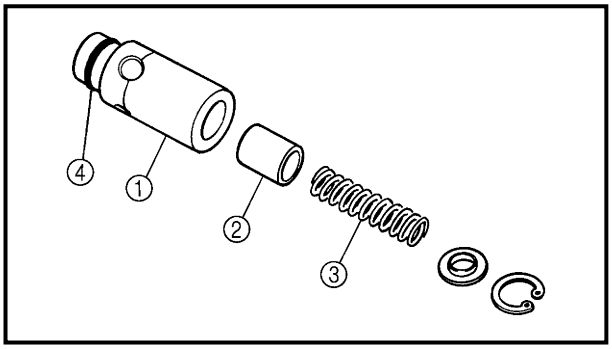
2. Measure:
 - inner-rotor-to-outer-rotor-tip clearance ⓐ
 - outer-rotor-to-oil-pump-housing clearance ⓑ
 Out of specification → Replace the oil pump.

① Inner rotor
② Outer rotor
③ Oil pump housing

Inner-rotor-to-outer-rotor-tip clearance
0.09 ~ 0.15 mm
Outer-rotor-to-oil-pump-housing clearance
0.03 ~ 0.08 mm

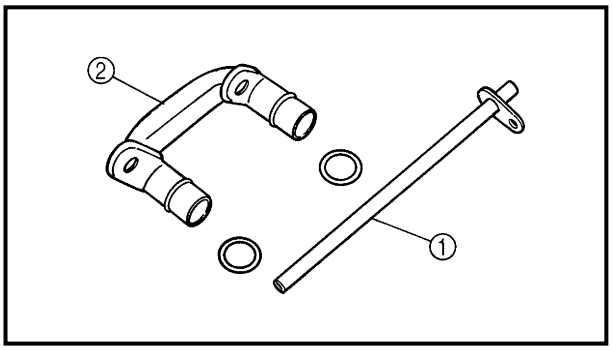


3. Check:
 • oil pump operation
 Unsmooth → Repair or replace the defective part(-s).
 Refer to "WATER PUMP" in chapter 5.



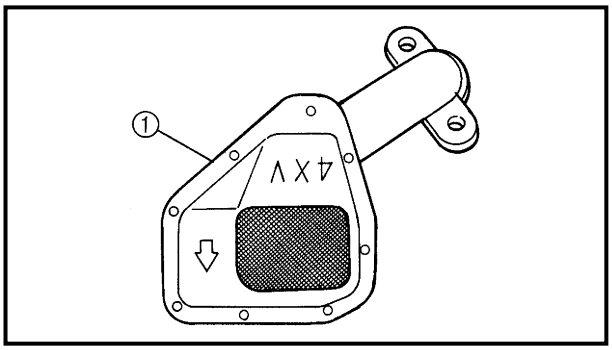
EB411410
CHECKING THE RELIEF VALVE

1. Check:
 • relief valve body ①
 • relief valve ②
 • spring ③
 • O-ring ④
 Damage/wear → Replace the defective part(-s).



EB411421
CHECKING THE OIL DELIVERY PIPE AND OIL PIPE

1. Check:
 • oil delivery pipe ①
 • oil pipe ②
 Damage → Replace.
 Obstruction → Wash and blow out with compressed air.



EB411430
CHECKING THE OIL STRAINER

1. Check:
 • oil strainer ①
 Damage → Replace.
 Contaminants → Clean with engine oil.

EB411701
ASSEMBLING THE OIL PUMP

1. Lubricate:
 • inner rotor
 • outer rotor
 • impeller shaft
 (with the recommended lubricant)

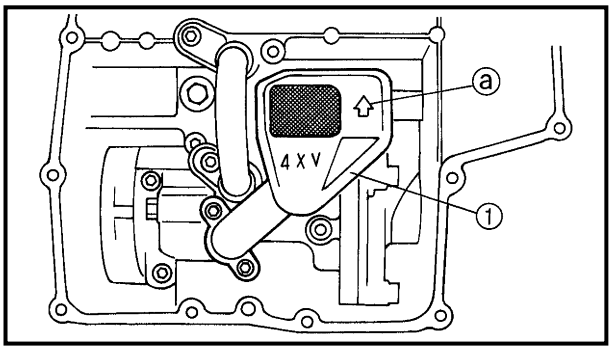
	Recommended lubricant **Engine oil**

2. Check:
 • oil pump operation
 Refer to "CHECKING THE OIL PUMP".

EB411710
INSTALLING THE OIL PUMP

1. Install:
 • oil pump ① **10 Nm (1.0 m · kg)**

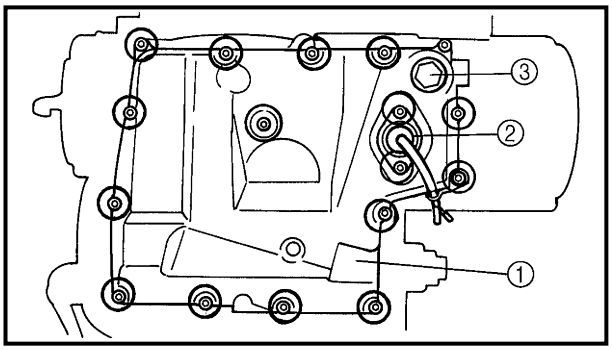
NOTE:
Install the oil/water pump assembly drive chain onto the oil/water pump assembly driven sprocket.



EB411720
INSTALLING THE OIL STRAINER

1. Install:
 • oil strainer ① **10 Nm (1.0 m · kg)**

NOTE:
The arrow ⓐ on the oil strainer housing must point towards the front of the engine.



EB411730
INSTALLING THE OIL PAN

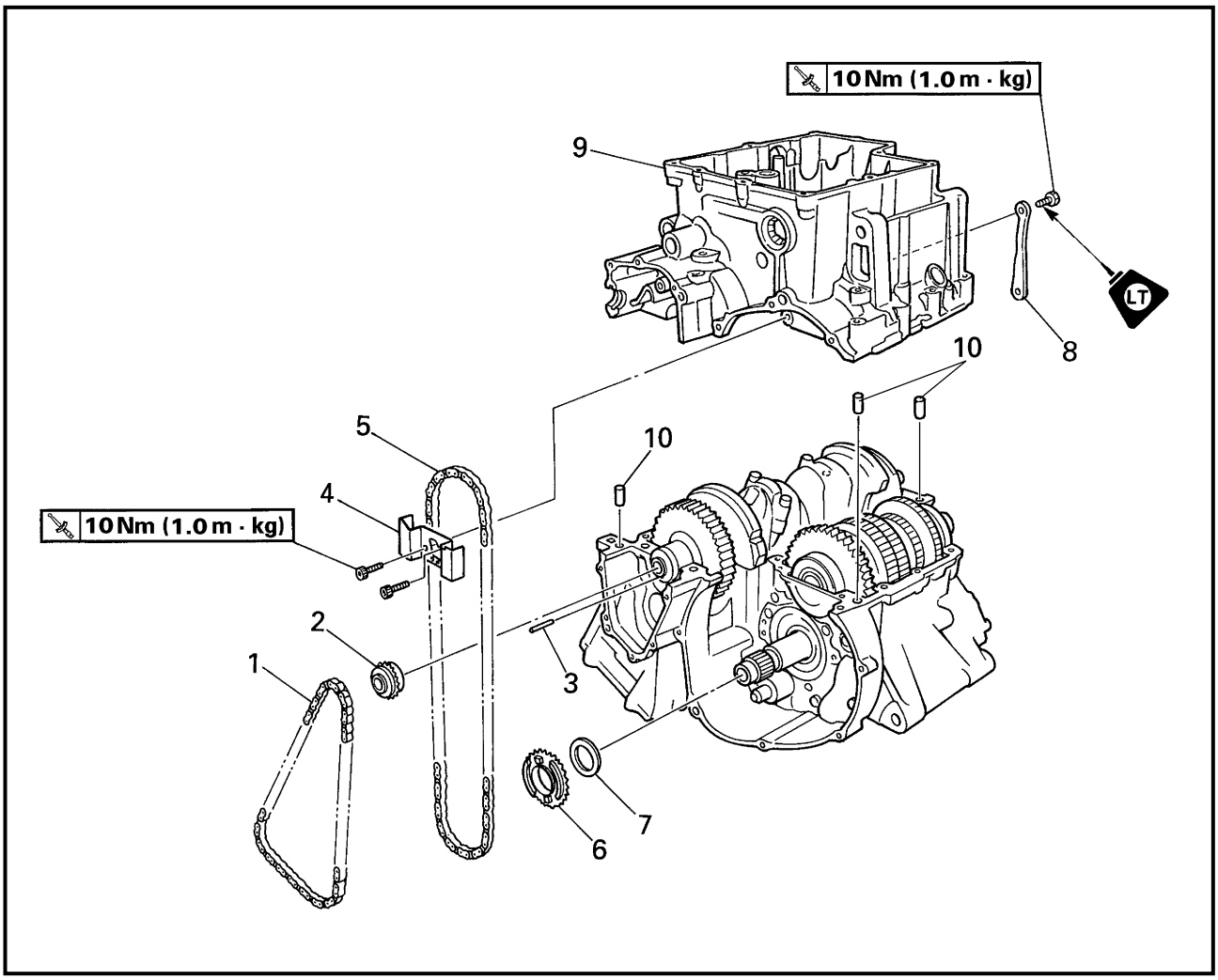
1. Install:
 • dowel pins
 • oil pan gasket New
 • oil pan ① **10 Nm (1.0 m · kg)**
 • oil level switch ② **10 Nm (1.0 m · kg)**
 • engine oil drain bolt ③ **43 Nm (4.3 m · kg)**

⚠ WARNING

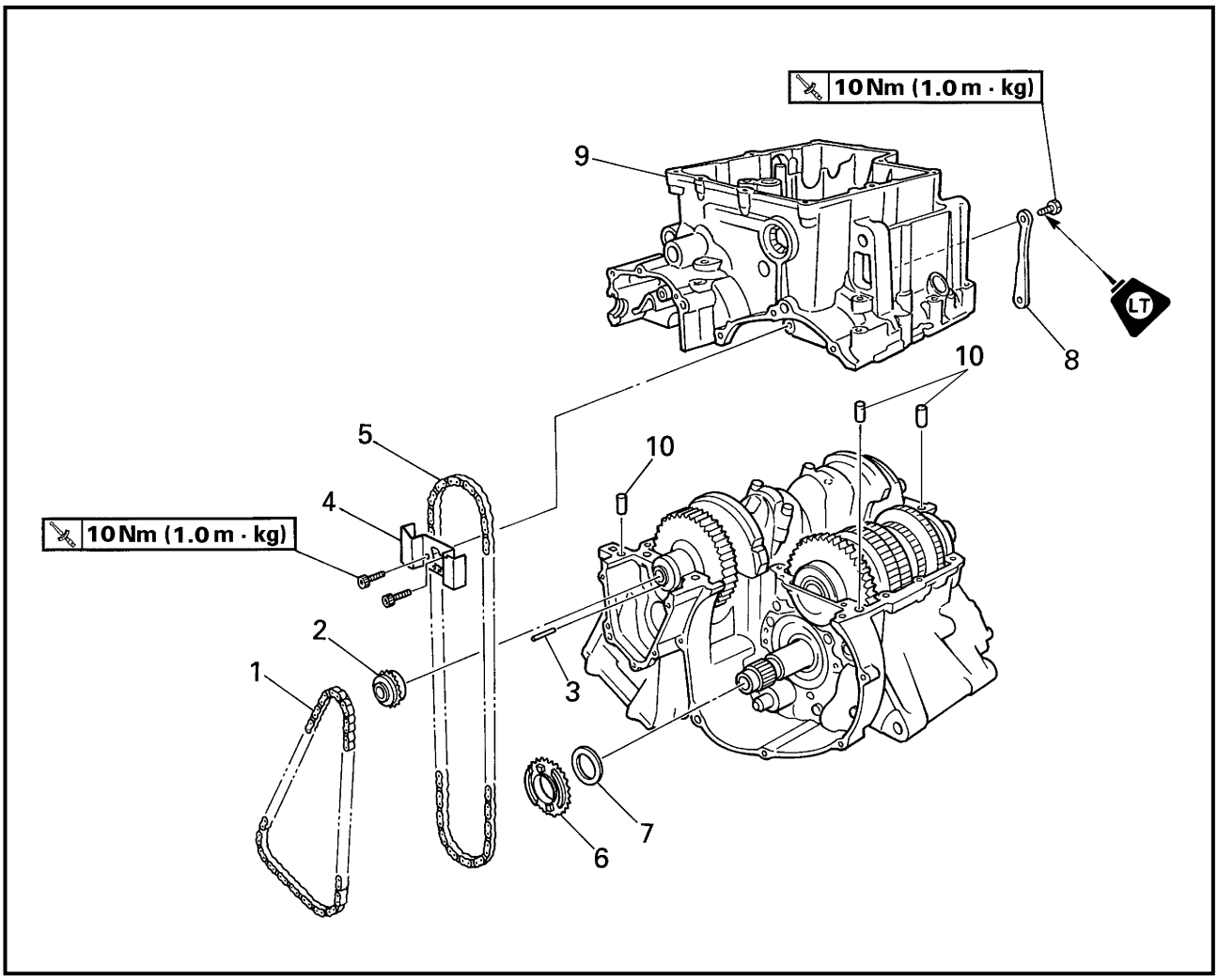
Always use new copper washers.

NOTE:
- Tighten the oil pan bolts in stages and in a crisscross pattern.
- Lubricate the oil level switch O-ring with lithium soap base grease.

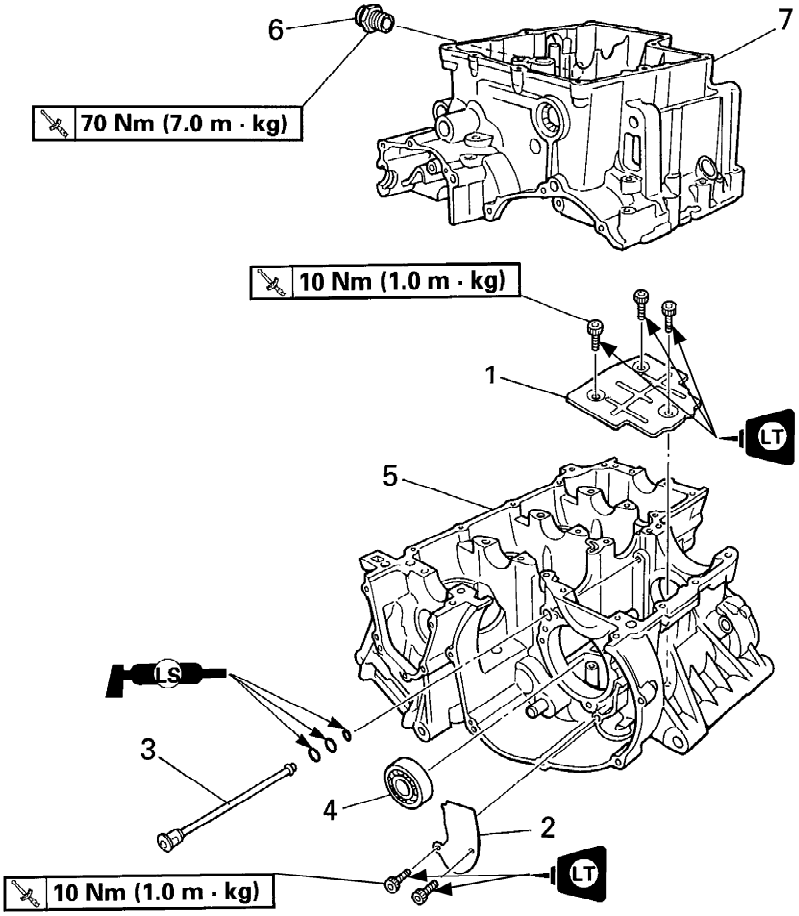
CRANKCASE



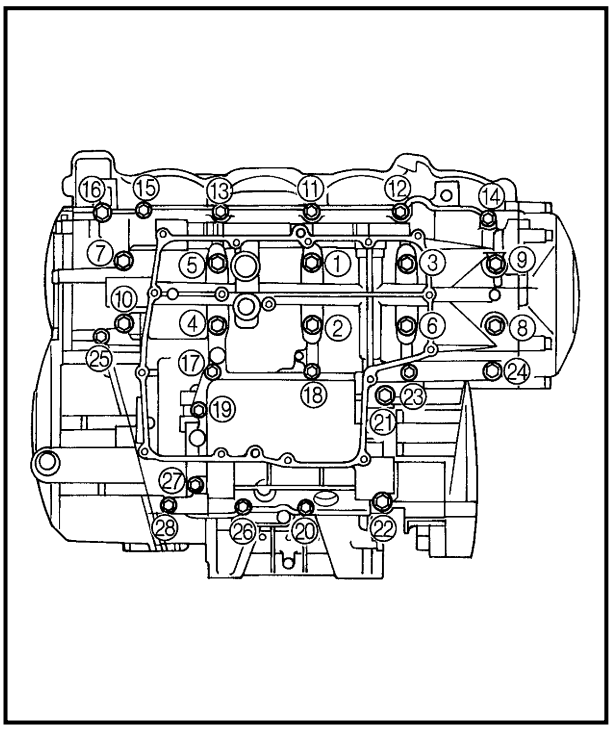
Order	Job/Part	Q'ty	Remarks
	Separating the crankcase		Remove the parts in the order listed.
	Engine		Refer to "ENGINE".
	Cylinder head		Refer to "CYLINDER HEAD".
	Pickup coil and pickup coil rotor		Refer to "PICKUP COIL".
	Stator coil assembly		Refer to "GENERATOR".
	Clutch housing and starter clutch idle gear		Refer to "CLUTCH".
	Oil/water pump assembly		Refer to "OIL PAN AND OIL PUMP".
1	Timing chain	1	
2	Crankshaft sprocket	1	
3	Pin	1	
4	Oil/water pump assembly drive chain guide	1	
5	Oil/water pump assembly drive chain	1	



Order	Job/Part	Q'ty	Remarks
6	Oil/water pump assembly drive sprocket	1	
7	Washer	1	
8	Plate	1	
9	Lower crankcase	1	
10	Dowel pin	3	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Removing the oil baffle plates and oil filter bolt		Remove the parts in the order listed.
	Connecting rod assemblies		Refer to "CONNECTING RODS AND PISTONS".
	Crankshaft		Refer to "CRANKSHAFT".
	Transmission		Refer to "TRANSMISSION".
1	Oil baffle plate	1	
2	Oil baffle plate	1	
3	Oil delivery pipe	1	
4	Bearing	1	
5	Upper crankcase	1	
6	Oil filter bolt	1	
7	Lower crankcase	1	
			For installation, reverse the removal procedure.



EB412100
DISASSEMBLING THE CRANKCASE

1. Remove:
 • crankcase bolts

NOTE:
- Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.
- Loosen the bolts in decreasing numerical order (refer to the numbers in the illustration).
- The numbers embossed on the crankcase indicate the crankcase tightening sequence.

2. Place the engine upside down.
3. Remove:
 • lower crankcase

CAUTION:
Tap on one side of the crankcase with a soft-face hammer. Tap only on reinforced portions of the crankcase, not on the crankcase mating surfaces. Work slowly and carefully and make sure that the crankcase halves separate evenly.

M9 × 115 mm bolts: ① ~ ⑩
M8 × 60 mm bolt: ㉑
M8 × 50 mm bolt: ㉒
M6 × 70 mm bolts: ⑰, ⑲, ㉕
M6 × 65 mm bolt: ㉗
M6 × 64 mm bolts: ⑯, ㉔
M6 × 60 mm bolt: ㉓
M6 × 55 mm bolts: ⑪ ~ ⑮
M6 × 50 mm bolt: ⑱
M6 × 45 mm bolts: ⑳, ㉖, ㉘

4. Remove:
 • dowel pins

5. Remove:
 • crankshaft journal lower bearing (from the lower crankcase)

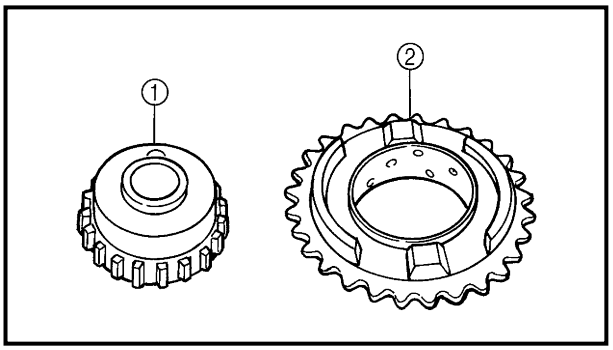
NOTE:
Identify the position of each crankshaft journal lower bearing so that it can be reinstalled in its original place.

EB412420
CHECKING THE CRANKCASE

1. Thoroughly wash the crankcase halves in a mild solvent.
2. Thoroughly clean all the gasket surfaces and crankcase mating surfaces.
3. Check:
 - upper crankcase
 - lower crankcase
 Cracks/damage → Replace.
 - oil delivery passages
 Obstruction → Blow out with compressed air.

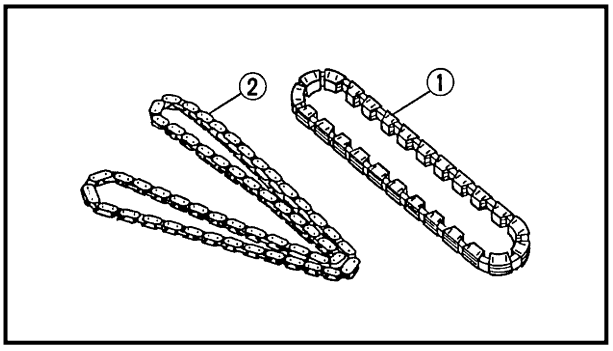
EB412440
CHECKING THE BEARINGS AND OIL SEALS

1. Check:
 - bearings
 Clean and lubricate the bearings, then rotate the inner race with your finger.
 Rough movement → Replace.



CHECKING THE SPROCKETS AND CHAINS

1. Check:
 - crankshaft sprocket ①
 - oil/water pump assembly drive sprocket ②
 Cracks/damage/wear → Replace the defective part(-s).

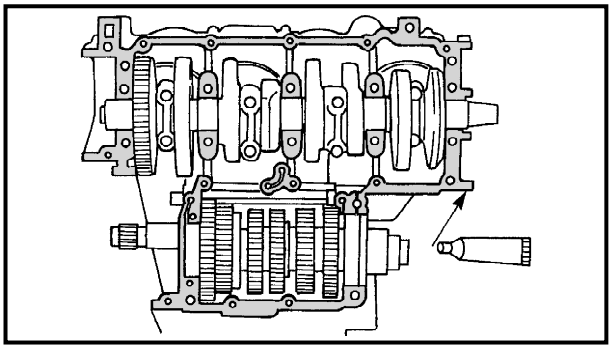


2. Check:
 - timing chain ①
 Damage/stiffness → Replace the timing chain and crankshaft sprocket as a set.
 - oil/water pump assembly drive chain ②
 Damage/stiffness → Replace the oil/water pump assembly drive chain and oil/water pump assembly drive sprocket as a set.

EB412743
ASSEMBLING THE CRANKCASE

1. Lubricate:
 • crankshaft journal bearings
 (with the recommended lubricant)

	Recommended lubricant **Engine oil**

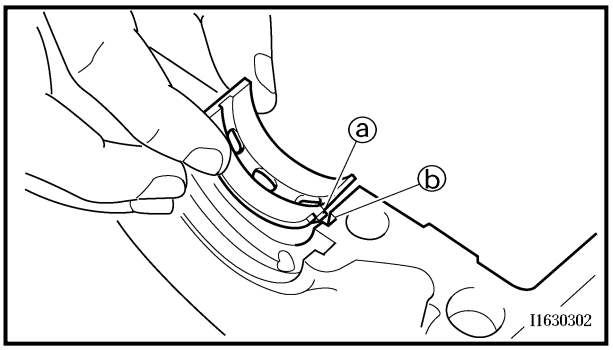


2. Apply:
 • sealant
 (onto the crankcase mating surfaces)

	Yamaha bond No. 1215 **90890-85505**

NOTE:
Do not allow any sealant to come into contact with the oil gallery or crankshaft journal bearings. Do not apply sealant to within 2 ~ 3 mm of the crankshaft journal bearings.

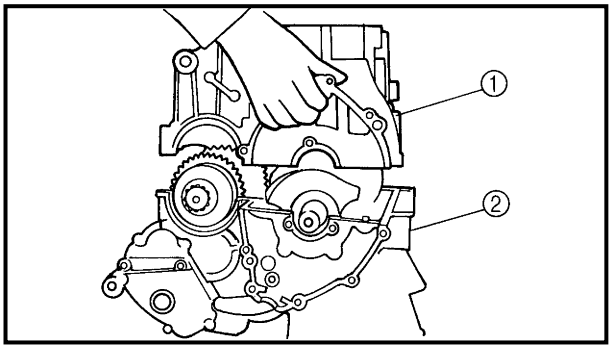
3. Install:
 • dowel pin



4. Install:
 • crankshaft journal lower bearings
 (into the lower crankcase)

NOTE:
- Align the projections ⓐ on the crankshaft journal lower bearings with the notches ⓑ in the lower crankcase.
- Install each crankshaft journal lower bearing in its original place.

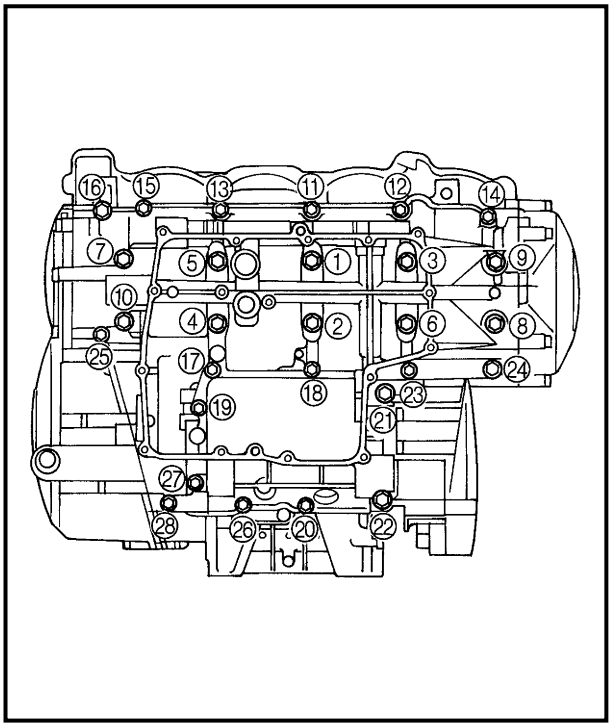
5. Set the shift drum assembly and transmission gears in the neutral position.



6. Install:
 • lower crankcase ①
 (onto the upper crankcase ②)

CAUTION:

Before tightening the crankcase bolts, make sure that the transmission gears shift correctly when the shift drum assembly is turned by hand.



7. Install:
 • crankcase bolts

NOTE:

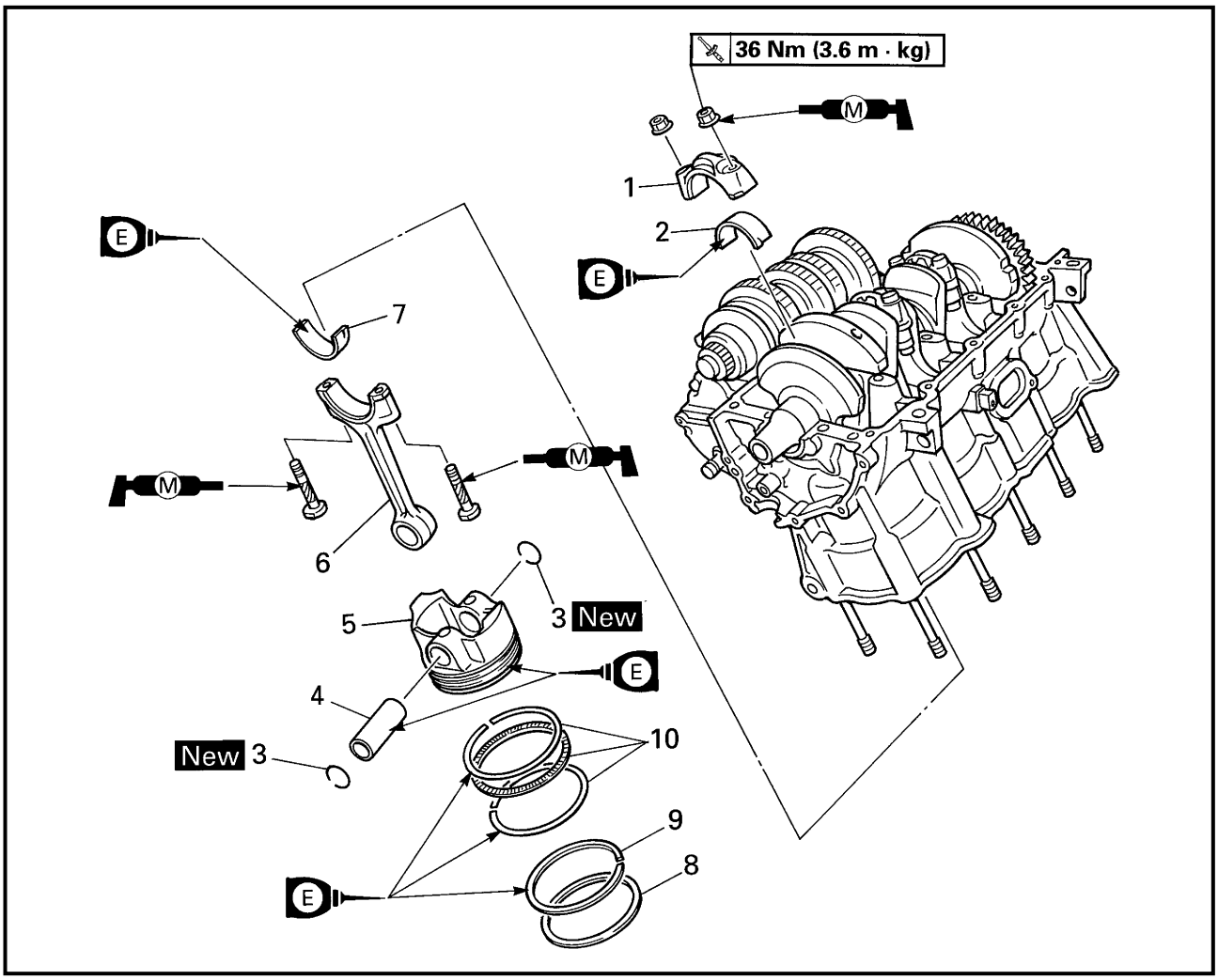
- Lubricate the bolt threads with engine oil.
- Install a washer on bolts ① ~ ⑩.
- Tighten the bolts in the tightening sequence cast on the crankcase.

M9 × 115 mm bolts: ① ~ ⑩
M8 × 60 mm bolt: ㉑
M8 × 50 mm bolt: ㉒
M6 × 70 mm bolts: ⑰, ⑲, ㉕
M6 × 65 mm bolt: ㉗
M6 × 64 mm bolts: ⑯, ㉔
M6 × 60 mm bolt: ㉓
M6 × 55 mm bolts: ⑪ ~ ⑮
M6 × 50 mm bolt: ⑱
M6 × 45 mm bolts: ⑳, ㉖, ㉘

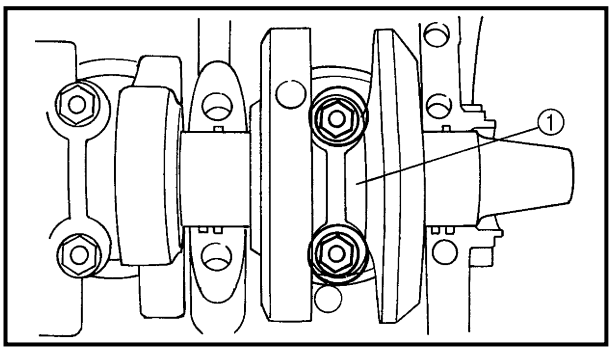


Bolt ① ~ ⑩
32 Nm (3.2 m • kg)
Bolt ⑪ ~ ⑮, ⑰ ~ ⑳, ㉓, ㉕ ~ ㉘
12 Nm (1.2 m • kg)
Bolt ⑯, ㉔
14 Nm (1.4 m • kg)
Bolt ㉑, ㉒
24 Nm (2.4 m • kg)

EB404001
CONNECTING RODS AND PISTONS



Order	Job/Part	Q'ty	Remarks
	Removing the connecting rods and pistons		Remove the parts in the order listed.
	Crankcase		Separate. Refer to "CRANKCASE".
1	Connecting rod cap	4	
2	Big end lower bearing	4	
3	Piston pin clip	8	
4	Piston pin	4	
5	Piston	4	
6	Connecting rod	4	
7	Big end upper bearing	4	
8	Top ring	4	
9	2nd ring	4	
10	Oil ring	4	
			For installation, reverse the removal procedure.

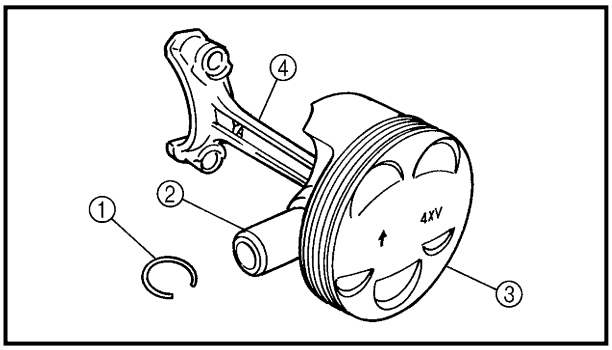


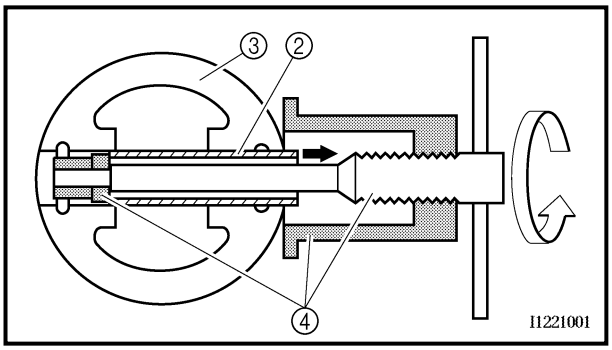
EB412131
REMOVING THE CONNECTING RODS AND PISTONS

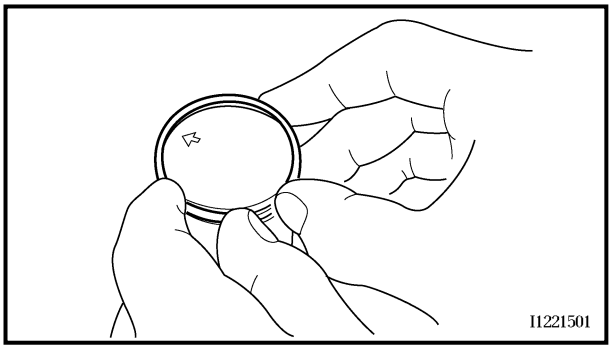
The following procedure applies to all of the connecting rods and pistons.

1. Remove:
 - connecting rod cap ①
 - big end bearings

NOTE:
Identify the position of each big end bearing so that it can be reinstalled in its original place.







2. Remove:
 - piston pin clips ①
 - piston pin ②
 - piston ③
 - connecting rod ④

CAUTION:
Do not use a hammer to drive the piston pin out.

NOTE:
- For reference during installation, put identification marks on the piston crown.
- Before removing the piston pin, deburr the piston pin clip groove and the piston pin bore area in the piston. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller ④.



Piston pin puller
90890-01304

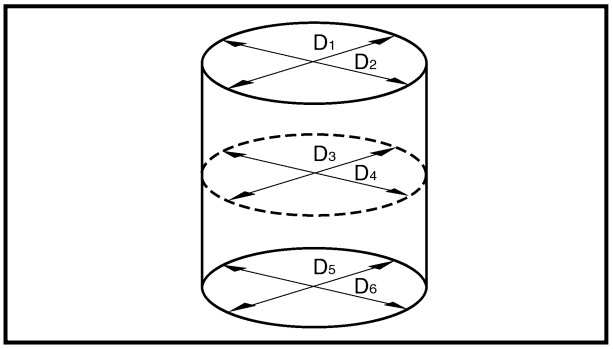
3. Remove:
 - top ring
 - 2nd ring
 - oil ring

NOTE:
To remove a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.

EB404403
CHECKING THE CYLINDERS AND PISTONS

The following procedure applies to all of the cylinders and pistons.

1. Check:
 - piston wall
 - cylinder wall
 Vertical scratches → Replace the crankcases, and the piston and piston rings as a set.



2. Measure:
 - piston-to-cylinder clearance

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Measure cylinder bore "C" with the cylinder bore gauge.

NOTE:
Measure cylinder bore "C" by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.

	Cylinder bore gauge 90890-03017

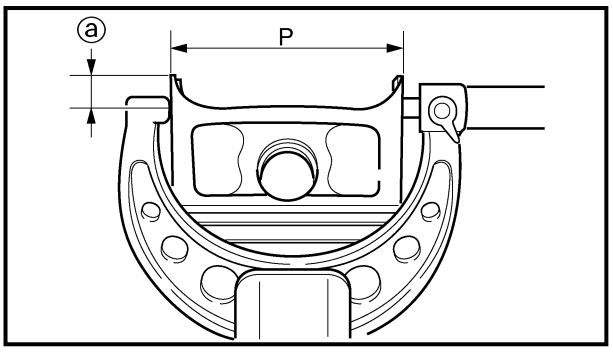
Cylinder bore "C"	**74.000 ~ 74.010 mm**
Max. taper "T"	**0.05 mm**
Out of round "R"	**0.05 mm**

"C"= maximum of D_1 ~ D_6
"T" = maximum of D_1, or D_2 – maximum of D_5 or D_6
"R" = maximum of D_1, D_3 or D_5 – minimum of D_2, D_4 or D_6

b. If out of specification, replace the crankcases, and the pistons and piston rings as a set.

c. Measure piston skirt diameter "P" with the micrometer.

	Micrometer 90890-03008



ⓐ 5 mm from the bottom edge of the piston

	Piston size "P"
Standard	**73.955 ~ 73.970 mm**

d. If out of specification, replace the piston and piston rings as a set.

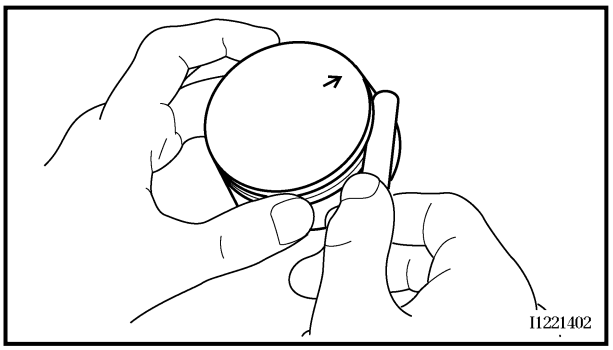
e. Calculate the piston-to-cylinder clearance with the following formula.

Piston-to-cylinder clearance =
Cylinder bore "C" –
Piston skirt diameter "P"

Piston-to-cylinder clearance
0.030 ~ 0.055 mm
<Limit>: 0.12 mm

f. If out of specification, replace the crankcases, and the pistons and piston rings as a set.

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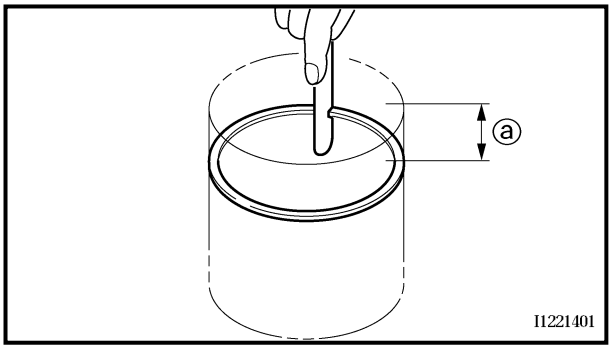


EB404410
CHECKING THE PISTON RINGS

1. Measure:
 • piston ring side clearance
 Out of specification → Replace the piston and piston rings as a set.

NOTE:
Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.

Piston ring side clearance
Top ring
0.030 ~ 0.065 mm
<Limit>: 0.115 mm
2nd ring
0.020 ~ 0.055 mm
<Limit>: 0.115 mm



2. Install:
 • piston ring
 (into the cylinder)

NOTE:
Level the piston ring in the cylinder with the piston crown.

ⓐ 5 mm

3. Measure:
 • piston ring end gap
 Out of specification → Replace the piston ring.

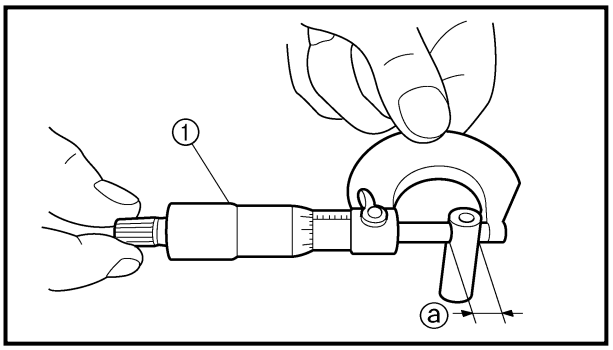
NOTE:
The oil ring expander spacer's end gap cannot be measured. If the oil ring rail's gap is excessive, replace all three piston rings.

Piston ring end gap
Top ring
0.19 ~ 0.31 mm
<Limit>: 0.56 mm
2nd ring
0.30 ~ 0.45 mm
<Limit>: 0.80 mm
Oil ring
0.10 ~ 0.35 mm

EB404421
CHECKING THE PISTON PINS

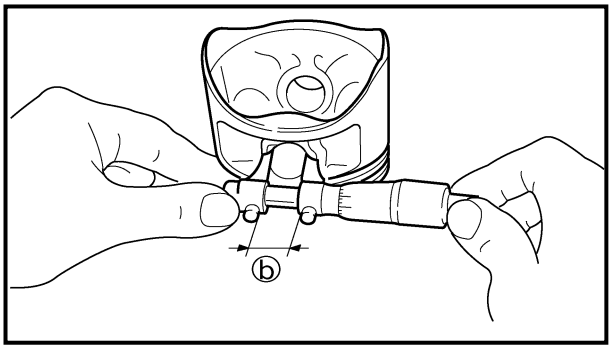
The following procedure applies to all of the piston pins.

1. Check:
 • piston pin
 Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.



2. Measure:
 • piston pin outside diameter ⓐ
 Out of specification → Replace the piston pin.

Piston pin outside diameter
16.991 ~ 17.000 mm
<Limit>: 16.971 mm



3. Measure:
 • piston pin bore diameter (in the piston)
 Out of specification → Replace the piston pin.

Piston pin bore diameter (in the piston)
17.002 ~ 17.013 mm
<Limit>: 17.043 mm

4. Calculate:
 • piston-pin-to-piston-pin-bore clearance
 Out of specification → Replace the piston pin.

Piston-pin-to-piston-pin-bore clearance = Piston pin bore diameter (in the piston) – Piston pin outside diameter

Piston-pin-to-piston-pin-bore clearance
0.002 ~ 0.022 mm
<Limit>: 0.072 mm

CHECKING THE BIG END BEARINGS

1. Measure:
 • crankshaft-pin-to-big-end-bearing clearance
 Out of specification → Replace the big end bearings.

Crankshaft-pin-to-big-end-bearing clearance
0.016 ~ 0.040 mm

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The following procedure applies to all of the connecting rods.

CAUTION:

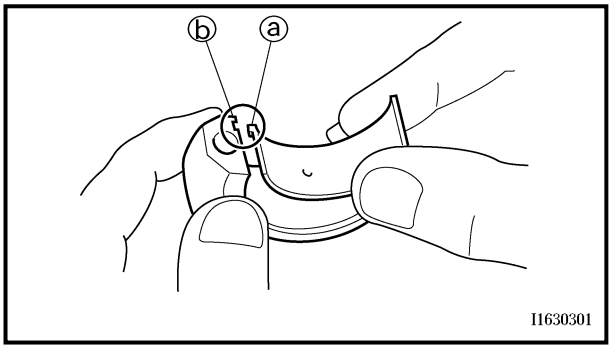
Do not interchange the big end bearings and connecting rods. To obtain the correct crankshaft-pin-to-big-end-bearing clearance and prevent engine damage, the big end bearings must be installed in their original positions.

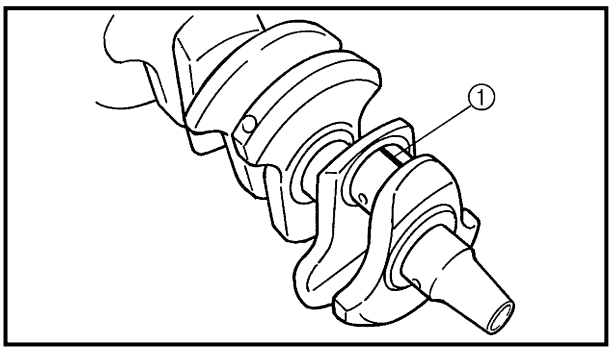
a. Clean the big end bearings, crankshaft pins, and bearing portions of the connecting rods.

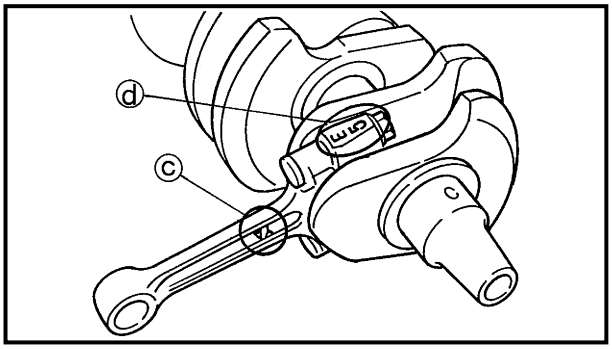
b. Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.

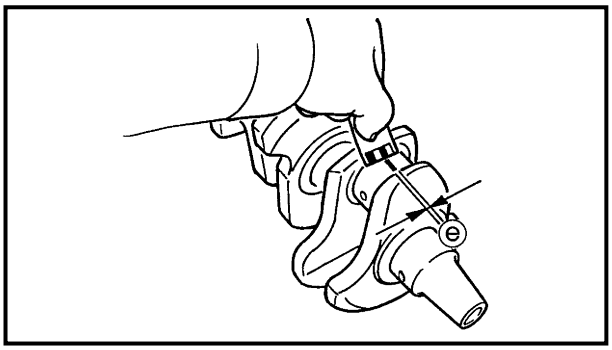
NOTE:

Align the projections ⓐ on the big end bearings with the notches ⓑ in the connecting rod and connecting rod cap.









c. Put a piece of Plastigauge® ① on the crankshaft pin.

d. Assemble the connecting rod halves.

NOTE:
- Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- Lubricate the bolt threads and nut seats with molybdenum disulfide grease.
- Make sure that the "Y" mark ⓒ on the connecting rod faces towards the left side of the crankshaft.
- Make sure that the characters ⓓ on both the connecting rod and connecting rod cap are aligned.

e. Tighten the connecting rod nuts.

CAUTION:
- **When tightening the connecting rod nuts, be sure to use an F-type torque wrench.**
- **Without pausing, tighten the connecting rod nuts to the specified torque. Apply continuous torque between 2.0 and 3.6 m • kg. Once you reach 2.0 m • kg, DO NOT STOP TIGHTENING until the specified torque is reached. If the tightening is interrupted between 2.0 and 3.6 m • kg, loosen the connecting rod nut to less than 2.0 m • kg and start again.**

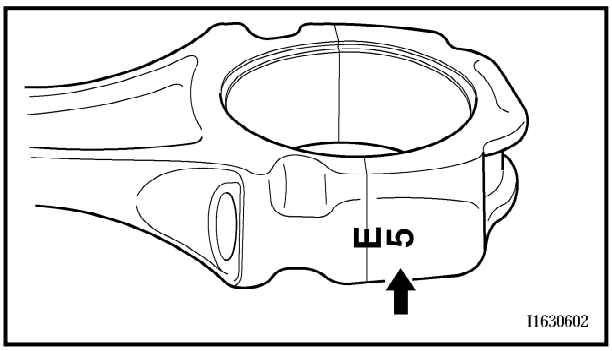
Refer to "INSTALLING THE PISTONS AND CONNECTING RODS".

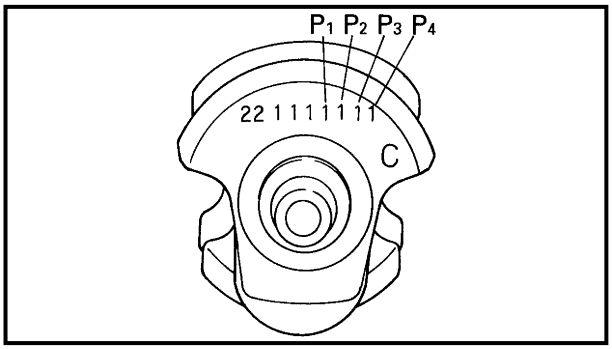
	Connecting rod nut **36 Nm (3.6 m • kg)**

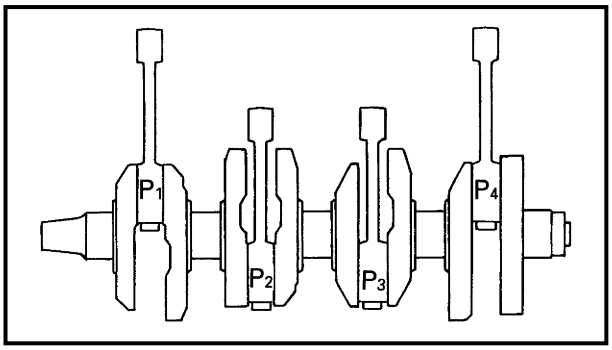
f. Remove the connecting rod and big end bearings.
Refer to "REMOVING THE CONNECTING RODS AND PISTONS".

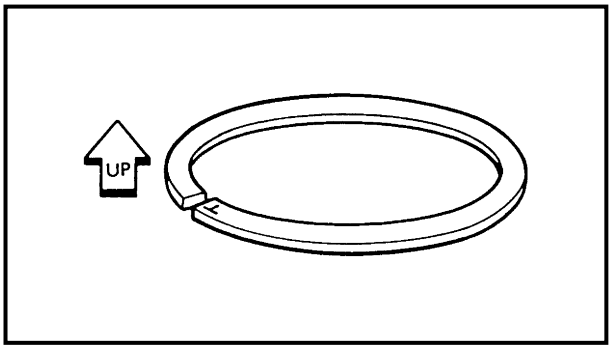
g. Measure the compressed Plastigauge® width ⓔ on the crankshaft pin.
If the crankshaft-pin-to-big-end-bearing clearance is out of specification, select replacement big end bearings.

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2. Select:
 • big end bearings ("P_1"~ "P_4")

NOTE:
- The numbers stamped into the crankshaft web and the numbers on the connecting rods are used to determine the replacement big end bearing sizes.
- "P_1"~"P_4" refer to the bearings shown in the crankshaft illustration.

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For example, if the connecting rod "P_1" and the crankshaft web "P_1" numbers are "5" and "1" respectively, then the bearing size for "P_1" is:

"P_1" (connecting rod) – "P_1" (crankshaft) – 2 =
5 – 1 – 2 = 2

BIG END BEARING COLOR CODE	
–1	**violet**
0	**white**
1	**blue**
2	**black**

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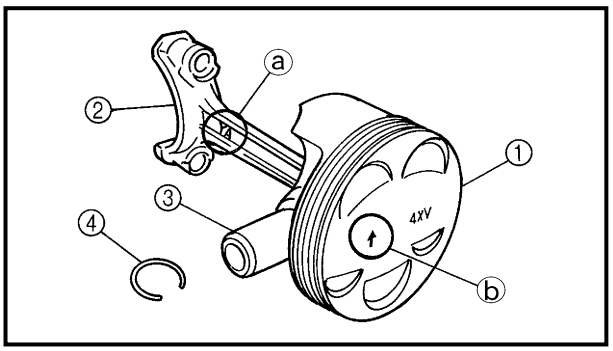
EB404704

INSTALLING THE PISTONS AND CONNECTING RODS

The following procedure applies to all of the pistons and cylinders.

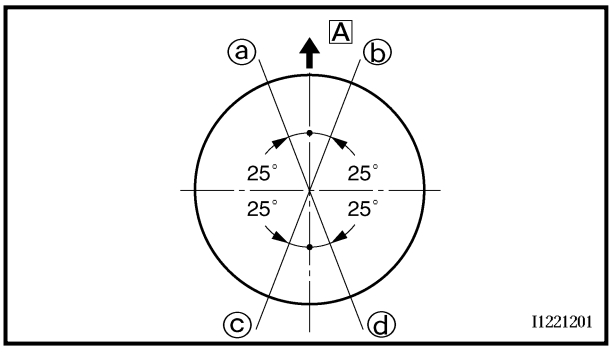
1. Install:
 • top ring
 • 2nd ring
 • oil ring

NOTE:
Be sure to install the piston rings so that the manufacturer's marks or numbers face up.



2. Install:
 - piston ①
 (onto the respective connecting rod ②)
 - piston pin ③
 - piston pin clip ④ New

NOTE:
- Apply engine oil onto the piston pin.
- Make sure that the "Y" mark ⓐ on the connecting rod faces left when the arrow mark ⓑ on the piston is pointing up. Refer to the illustration.
- Reinstall each piston into its original cylinder (numbering order starting from the left: #1 to #4).



3. Offset:
 - piston ring end gaps
 ⓐ Top ring
 ⓑ Lower oil ring rail
 ⓒ Upper oil ring rail
 ⓓ 2nd ring
 Ⓐ Intake side

4. Lubricate:
 - piston
 - piston rings
 - cylinder
 (with the recommended lubricant)

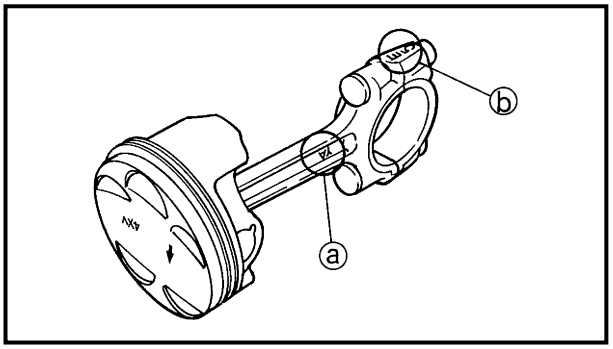
	Recommended lubricant **Engine oil**

5. Lubricate:
 - bolt threads
 - nut seats
 (with the recommended lubricant)

	Recommended lubricant **Molybdenum disulfide grease**

6. Lubricate:
 • crankshaft pins
 • big end bearings
 • connecting rod big end inner surface
 (with the recommended lubricant)

	Recommended lubricant **Engine oil**



7. Install:
 • big end bearings
 • connecting rod assembly
 (into the cylinder and onto the crankshaft pin)
 • connecting rod cap
 (onto the connecting rod)

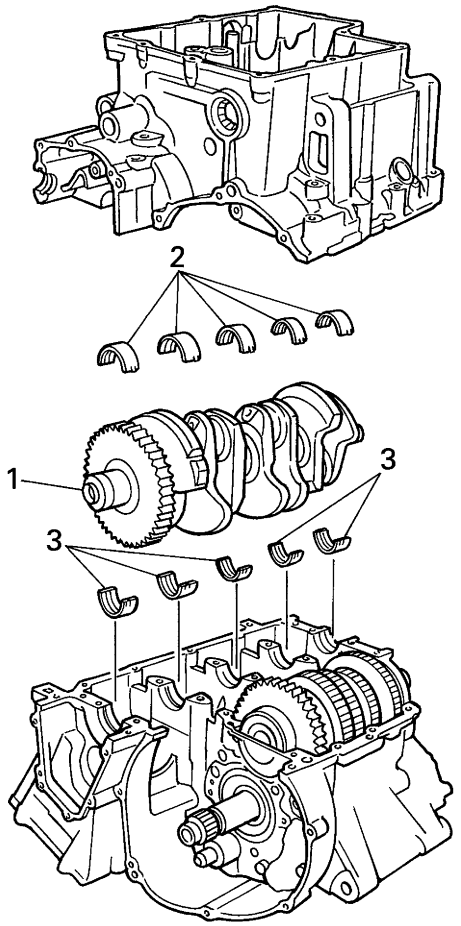
NOTE:
- Align the projections on the big end bearings with the notches in the connecting rods and connecting rod caps.
- Be sure to reinstall each big end bearing in its original place.
- While compressing the piston rings with one hand, install the connecting rod assembly into the cylinder with the other hand.
- Make sure that the "Y" marks ⓐ on the connecting rods face towards the left side of the crankshaft.
- Make sure that the characters ⓑ on both the connecting rod and connecting rod cap are aligned.

8. Align:
 • bolt heads
 (with the connecting rod caps)
9. Tighten:
 • connecting rod nuts

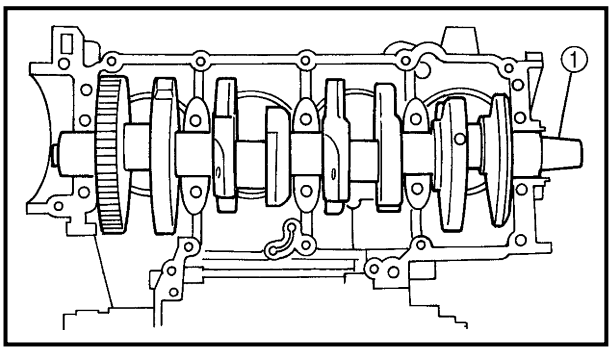
	36 Nm (3.6 m · kg)

CAUTION:
- **When tightening the connecting rod nuts, be sure to use an F-type torque wrench.**
- **Without pausing, tighten the connecting rod nuts to the specified torque. Apply continuous torque between 2.0 and 3.6 m • kg. Once you reach 2.0 m • kg DO NOT STOP TIGHTENING until the specified torque is reached. If the tightening is interrupted between 2.0 and 3.6 m • kg, loosen the connecting rod nut to less than 2.0 m • kg and start again.**

EB412000
CRANKSHAFT



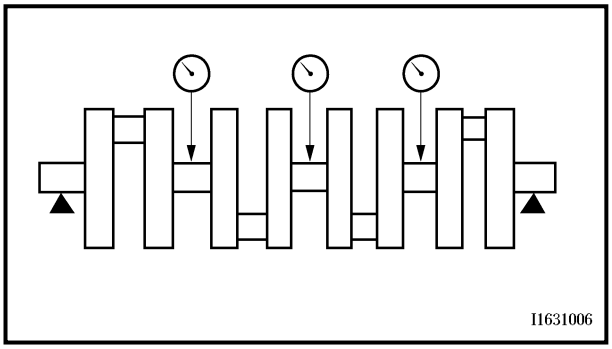
Order	Job/Part	Q'ty	Remarks
	Removing the crankshaft assembly		Remove the parts in the order listed.
	Crankcase		Separate. Refer to "CRANKCASE".
	Connecting rod caps		Refer to "CONNECTING RODS AND PISTONS".
1	Crankshaft	1	
2	Crankshaft journal lower bearing	5	
3	Crankshaft journal upper bearing	5	
			For installation, reverse the removal procedure.



EB412110
REMOVING THE CRANKSHAFT

1. Remove:
 - crankshaft ①
 - crankshaft journal upper bearings (from the upper crankcase)

NOTE:
Identify the position of each crankshaft journal upper bearing so that it can be reinstalled in its original place.



EB412403
CHECKING THE CRANKSHAFT

1. Measure:
 - crankshaft runout
 Out of specification → Replace the crankshaft.

Max. crankshaft runout
0.03 mm

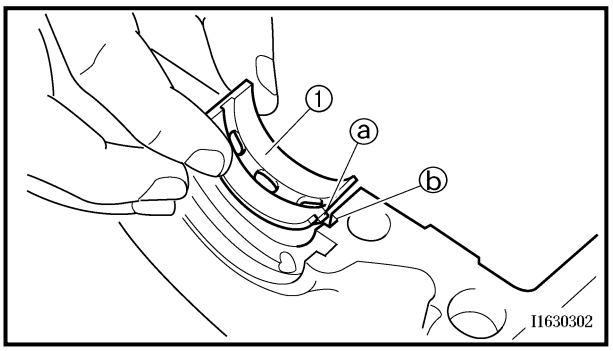
2. Check:
 - crankshaft journal surfaces
 - crankshaft pin surfaces
 - bearing surfaces
 Scratches/wear → Replace the crankshaft.

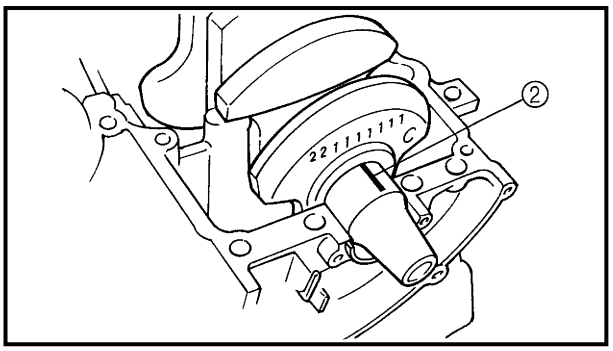
CHECKING THE CRANKSHAFT JOURNAL BEARINGS

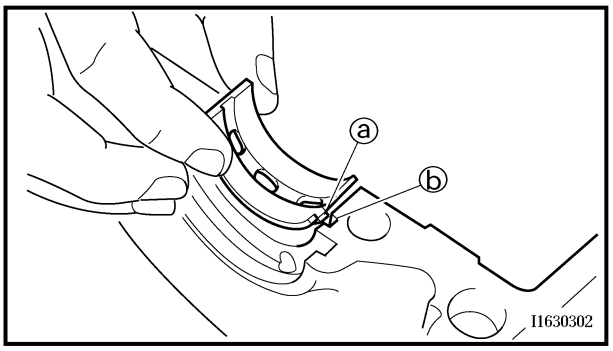
1. Measure:
 - crankshaft-journal-to-crankshaft-journal-bearing clearance
 Out of specification → Replace the crankshaft journal bearings.

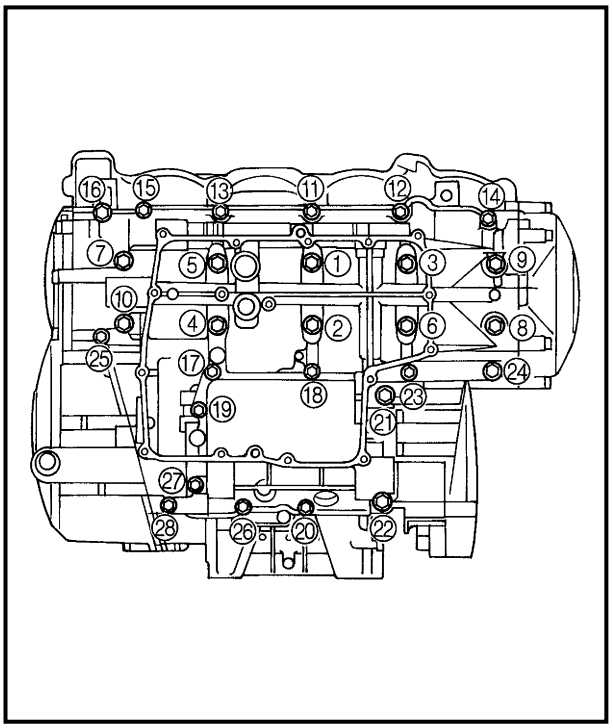
Crankshaft-journal-to-crankshaft-journal-bearing clearance
0.004 ~ 0.028 mm

CAUTION:
Do not interchange the crankshaft journal bearings. To obtain the correct crankshaft-journal-to-crankshaft-journal-bearing clearance and prevent engine damage, the crankshaft journal bearings must be installed in their original positions.









a. Clean the crankshaft journal bearings, crankshaft journals, and bearing portions of the crankcase.

b. Place the upper crankcase upside down on a bench.

c. Install the crankshaft journal upper bearings ① and the crankshaft into the upper crankcase.

NOTE:
Align the projections ⓐ on the crankshaft journal upper bearings with the notches ⓑ in the upper crankcase.

d. Put a piece of Plastigauge® ② on each crankshaft journal.

NOTE:
Do not put the Plastigauge® over the oil hole in the crankshaft journal.

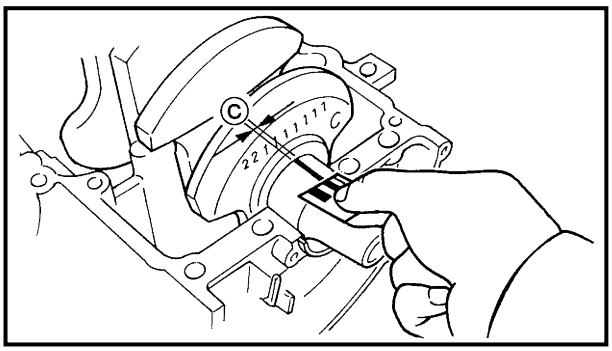
e. Install the crankshaft journal lower bearings into the lower crankcase and assemble the crankcase.

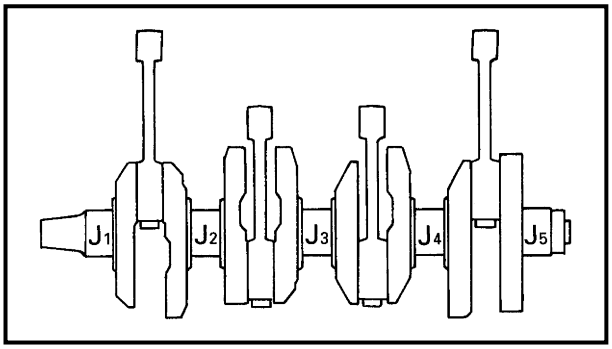
NOTE:
- Align the projections ⓐ on the crankshaft journal lower bearings with the notches ⓑ in the lower crankcase.
- Do not move the crankshaft until the clearance measurement has been completed.

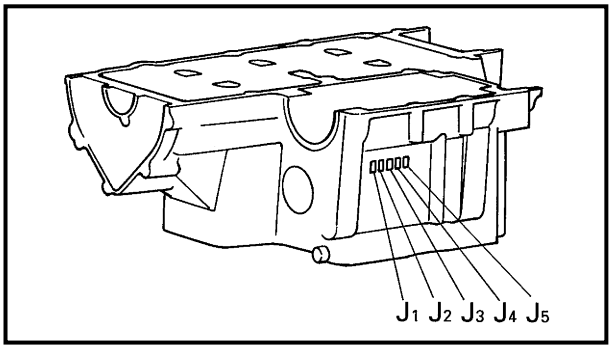
f. Tighten the bolts to specification in the tightening sequence cast on the crankcase.

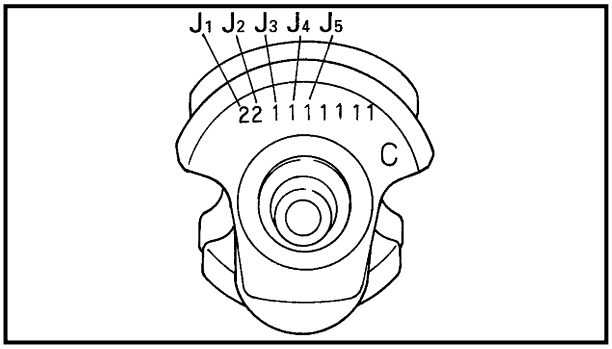
Bolt ① ~ ⑩
32 Nm (3.2 m • kg)
Bolt ⑪ ~ ⑮, ⑰ ~ ⑳, ㉓, ㉕ ~ ㉘
12 Nm (1.2 m • kg)
Bolt ⑯, ㉔
14 Nm (1.4 m • kg)
Bolt ㉑, ㉒
24 Nm (2.4 m • kg)

NOTE:
Lubricate the crankcase bolt threads with engine oil.









g. Remove the lower crankcase and the crankshaft journal lower bearings.

h. Measure the compressed Plastigauge® width Ⓒ on each crankshaft journal.
If the clearance is out of specification, select replacement crankshaft journal bearings.

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2. Select:
• crankshaft journal bearings (J_1 ~ J_5)

NOTE:
- The numbers stamped into the crankshaft web and the numbers stamped into the lower crankcase are used to determine the replacement crankshaft journal bearing sizes.
- "J_1" ~ "J_5" refer to the bearings shown in the crankshaft illustration.
- If "J_1" ~ "J_5" are the same, use the same size for all of the bearings.

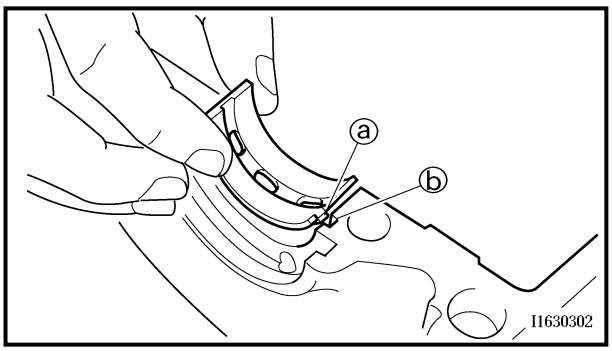
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For example, if the crankcase "J_1" and crankshaft web "J_1" numbers are "6" and "2" respectively, then the bearing size for "J_1" is:

Bearing size for J_1:
"J_1" (crankcase) – "J_1" (crankshaft web) – 2 =
6 – 2 – 2 = 2

CRANKSHAFT JOURNAL BEARING COLOR CODE	
–1	**pink/violet**
0	**pink/white**
1	**pink/blue**
2	**pink/black**
3	**pink/brown**

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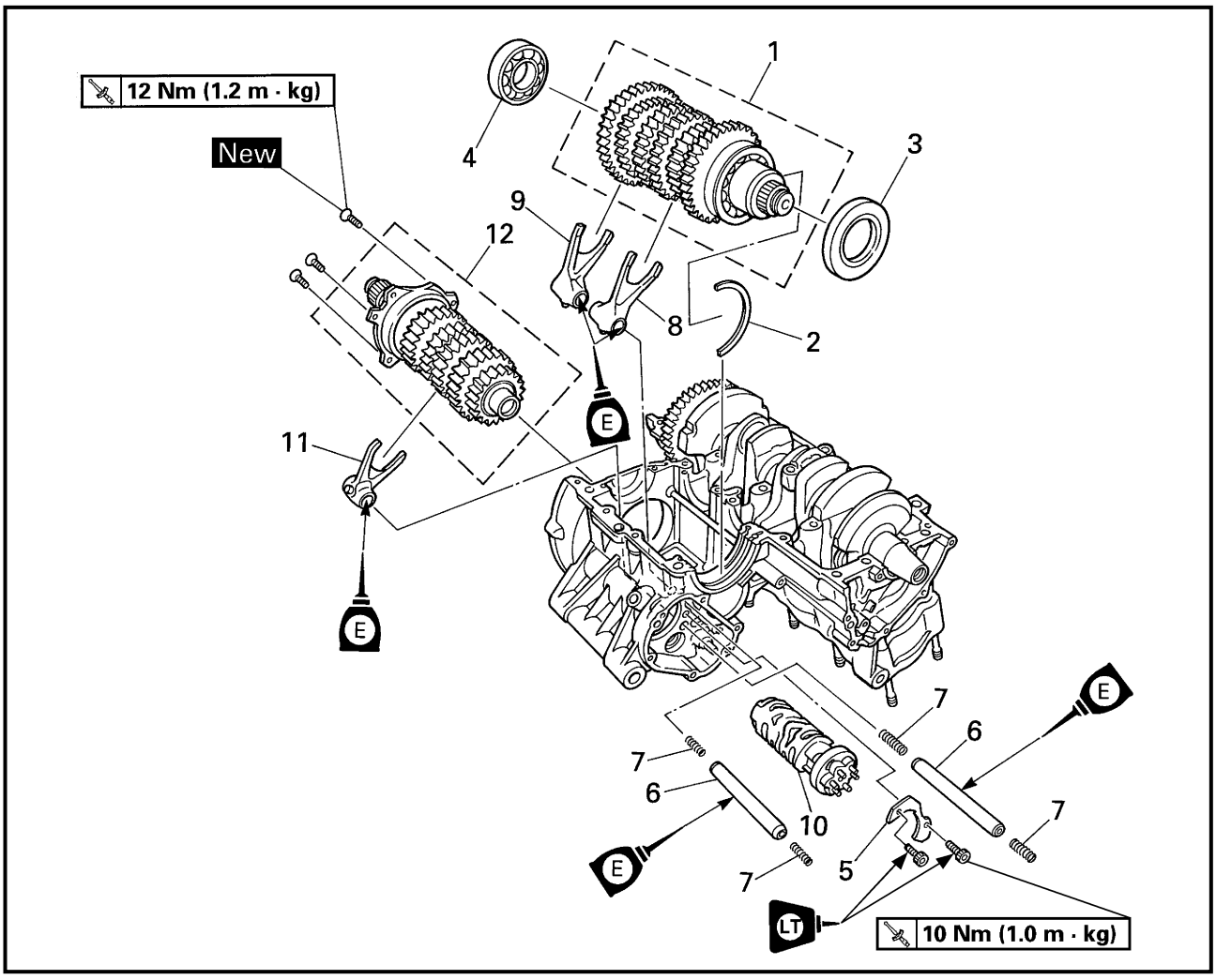


EB412720
INSTALLING THE CRANKSHAFT

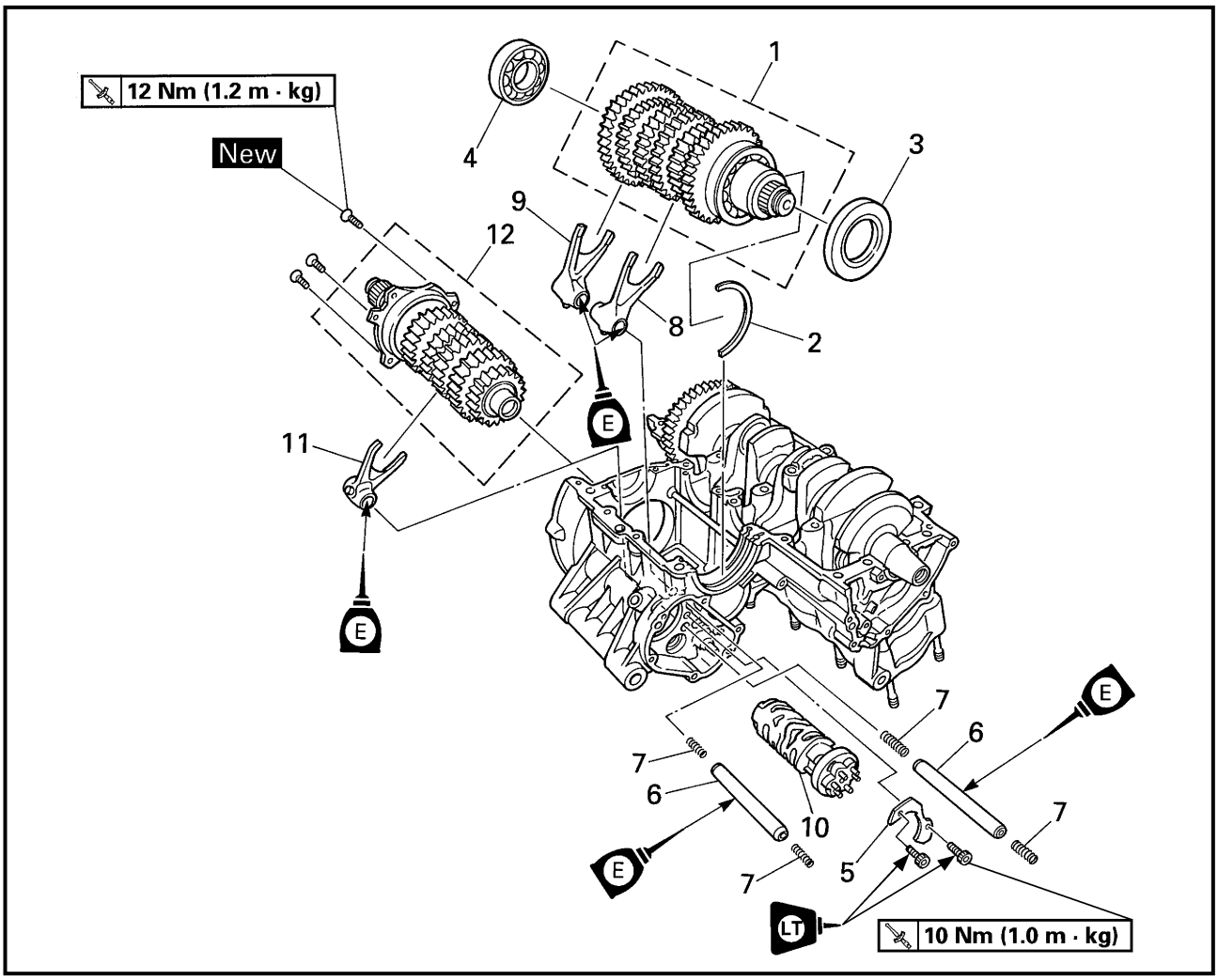
1. Install:
 - crankshaft journal upper bearings (into the upper crankcase)

NOTE:
- Align the projections ⓐ on the crankshaft journal upper bearings with the notches ⓑ in the upper crankcase.
- Be sure to install each crankshaft journal upper bearing in its original place.

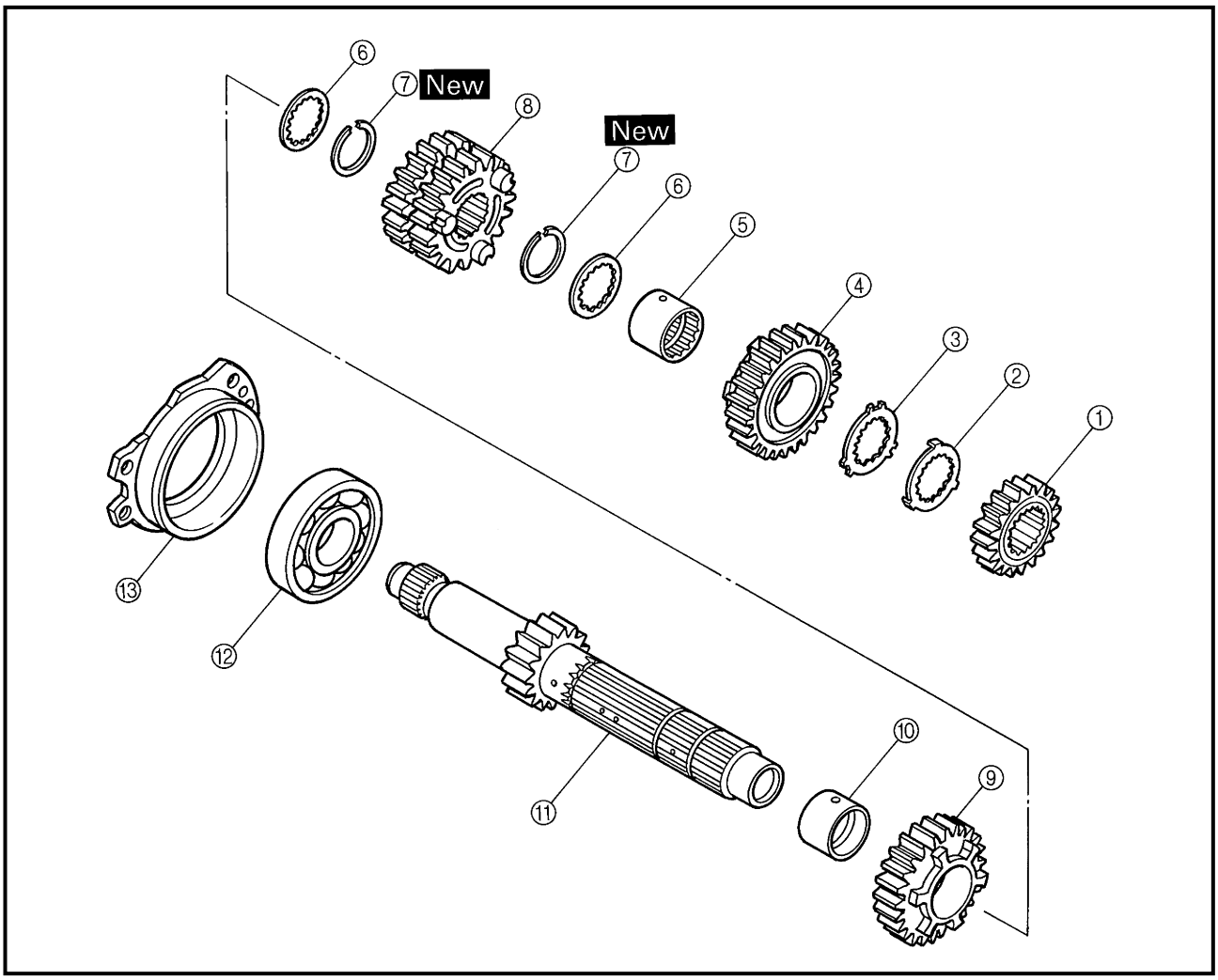
EB413000
TRANSMISSION



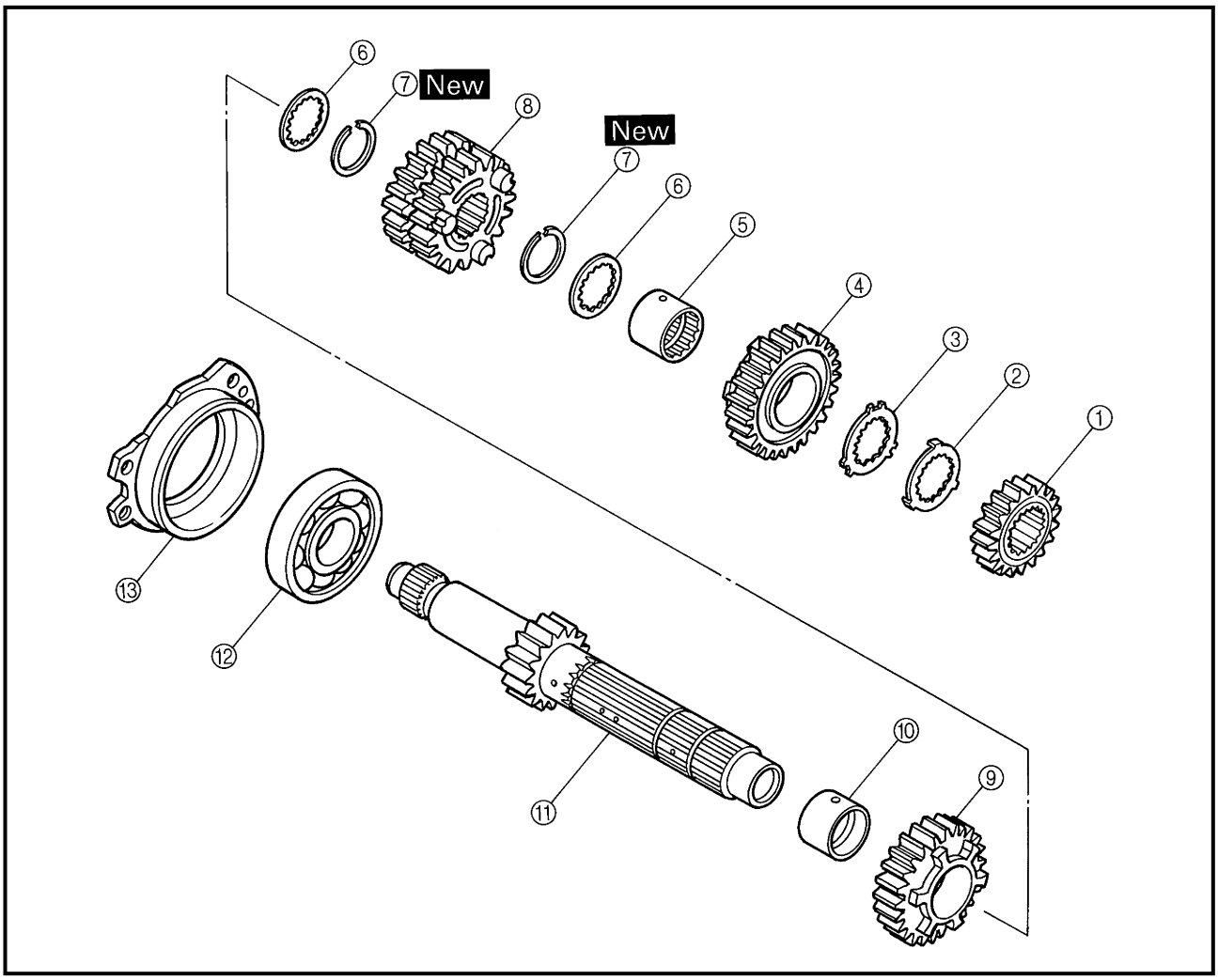
Order	Job/Part	Q'ty	Remarks
	Removing the transmission, shift drum assembly, and shift forks		Remove the parts in the order listed.
	Crankcase		Separate. Refer to "CRANKCASE".
	Stopper lever		Refer to "SHIFT SHAFT".
1	Drive axle assembly	1	
2	Circlip	1	
3	Oil seal	1	
4	Bearing	1	
5	Shift drum retainer	1	
6	Shift fork guide bar	2	
7	Spring	4	
8	Shift fork "L"	1	
9	Shift fork "R"	1	



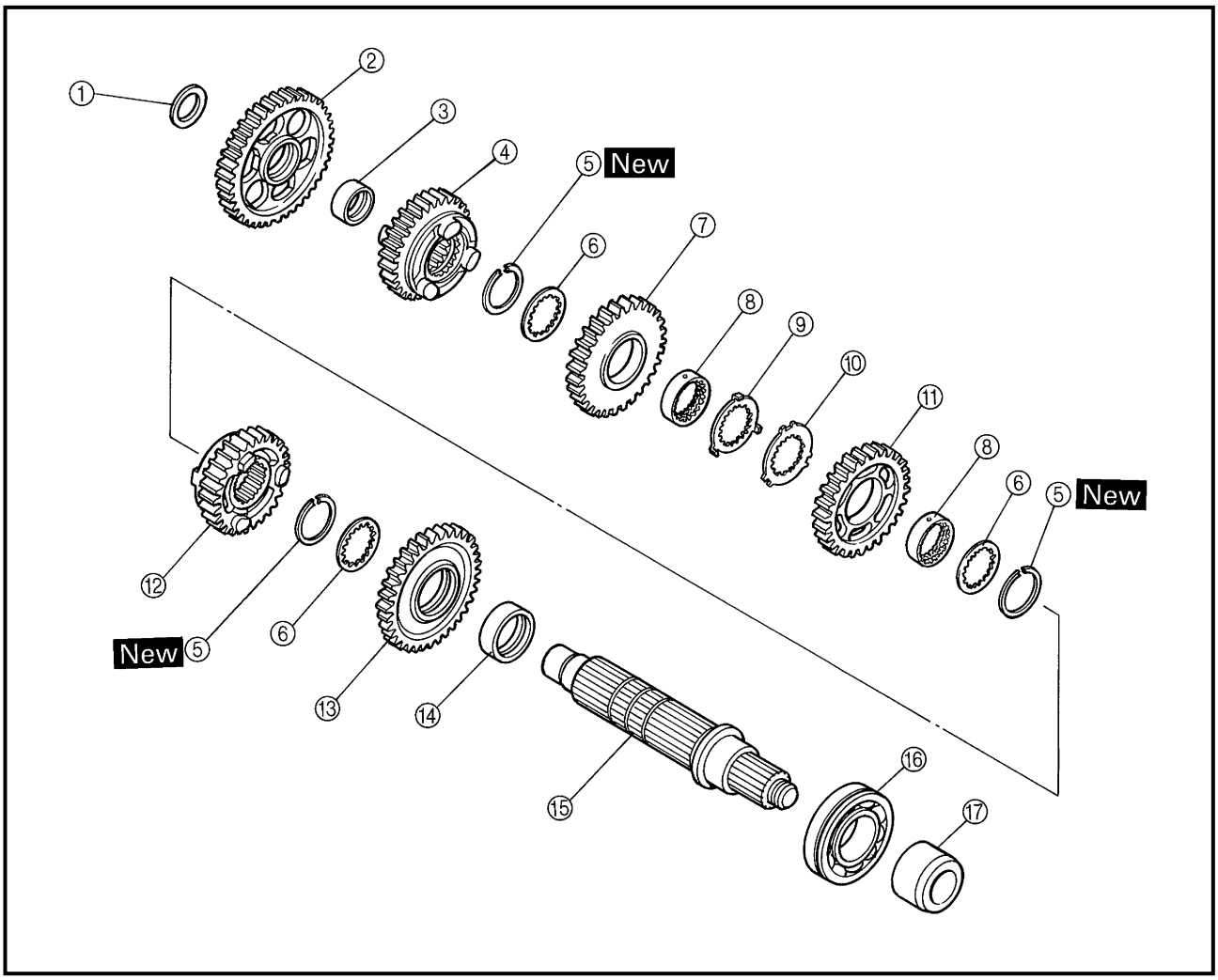
Order	Job/Part	Q'ty	Remarks
10	Shift drum assembly	1	
11	Shift fork "C"	1	
12	Main axle assembly	1	
			For installation, reverse the removal procedure.



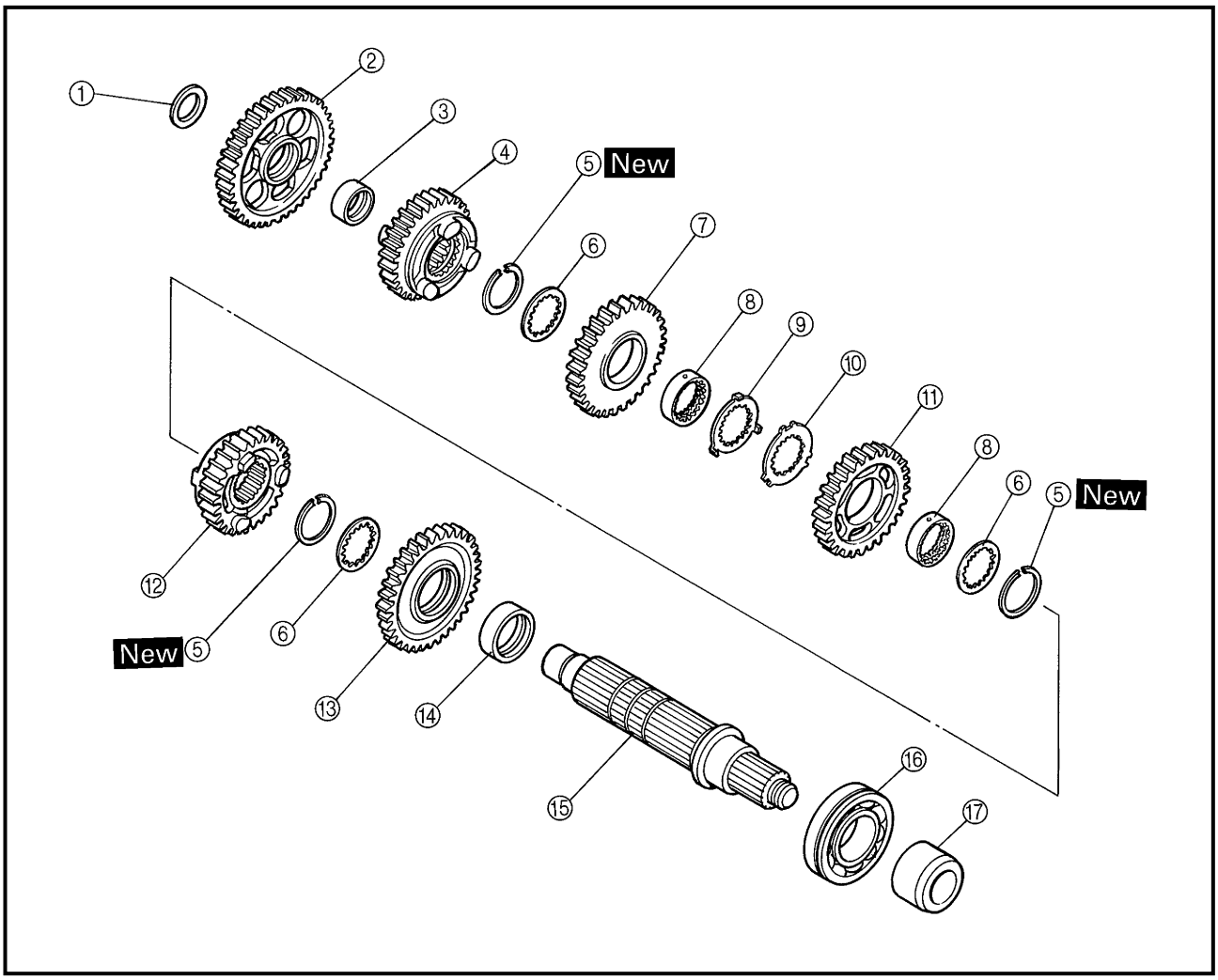
Order	Job/Part	Q'ty	Remarks
	Disassembling the main axle assembly		Remove the parts in the order listed.
①	2nd pinion gear	1	
②	Toothed lock washer	1	
③	Toothed lock washer retainer	1	
④	6th pinion gear	1	
⑤	Toothed spacer	1	
⑥	Toothed washer	2	
⑦	Circlip	2	
⑧	3rd/4th pinion gears	1	
⑨	5th pinion gear	1	
⑩	Collar	1	



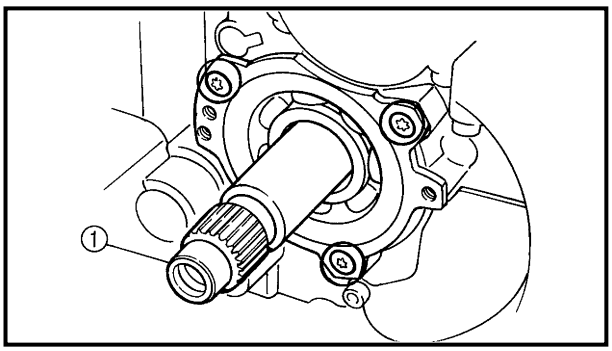
Order	Job/Part	Q'ty	Remarks
⑪	Main axle/1st pinion gear	1	
⑫	Bearing	1	
⑬	Main axle bearing housing	1	
			For installation, reverse the removal procedure.

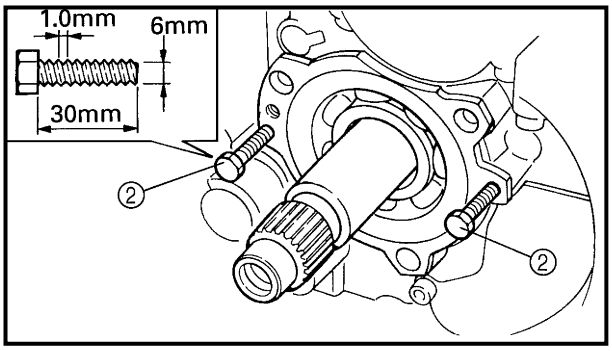


Order	Job/Part	Q'ty	Remarks
	Disassembling the drive axle assembly		Remove the parts in the order listed.
①	Washer	1	
②	1st wheel gear	1	
③	Spacer	1	
④	5th wheel gear	1	
⑤	Circlip	3	
⑥	Washer	3	
⑦	3rd wheel gear	1	
⑧	Toothed spacer	2	
⑨	Toothed lock washer	1	
⑩	Toothed lock washer retainer	1	



Order	Job/Part	Q'ty	Remarks
⑪	4th wheel gear	1	
⑫	6th wheel gear	1	
⑬	2nd wheel gear	1	
⑭	Spacer	1	
⑮	Drive axle	1	
⑯	Bearing	1	
⑰	Spacer	1	
			For installation, reverse the removal procedure.





EB413100
REMOVING THE TRANSMISSION

1. Remove:
 • main axle assembly ①
 (with the Torx® wrench T30)

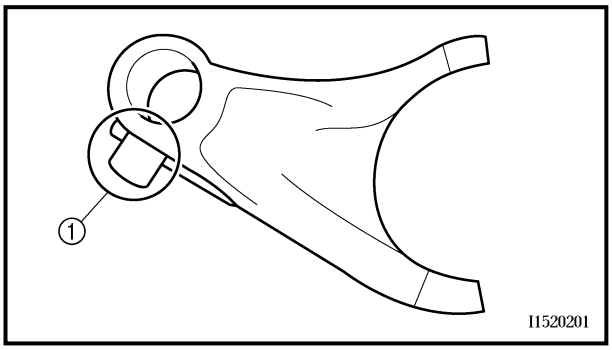
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a. Insert two bolts ② of the proper size, as shown in the illustration, into the main axle assembly bearing housing.

b. Tighten the bolts until they contact the crankcase surface.

c. Continue tightening the bolts until the main axle assembly comes free from the upper crankcase.

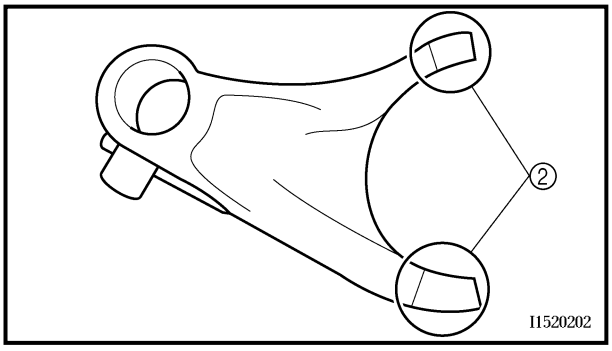
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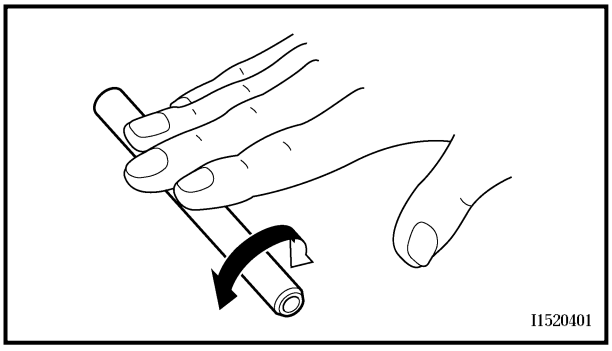


EB413400
CHECKING THE SHIFT FORKS

The following procedure applies to all of the shift forks.

1. Check:
 • shift fork cam follower ①
 • shift fork pawl ②
 Bends/damage/scoring/wear → Replace the shift fork.

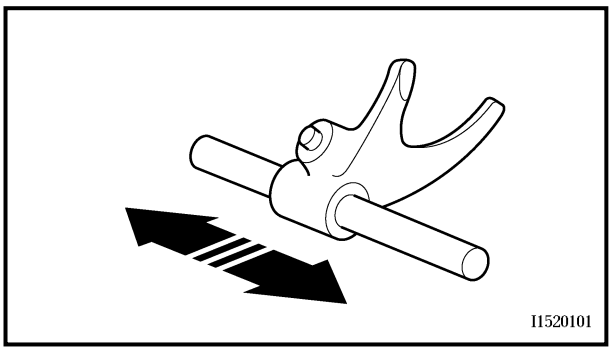




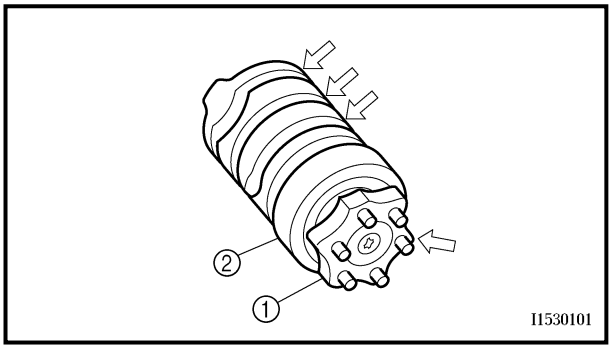
2. Check:
 • shift fork guide bar
 Roll the shift fork guide bar on a flat surface.
 Bends → Replace.

⚠ WARNING

Do not attempt to straighten a bent shift fork guide bar.

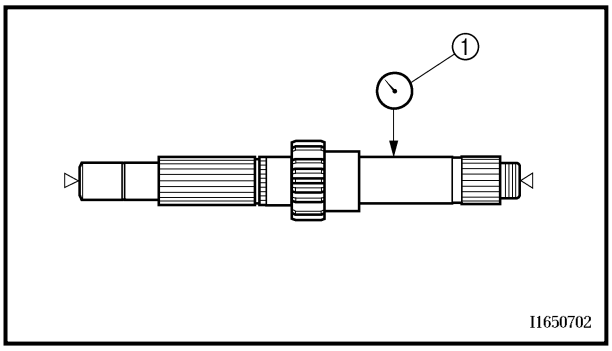


3. Check:
 - shift fork movement
 (along the shift fork guide bar)
 Rough movement → Replace the shift fork(-s) and shift fork guide bar as a set.



EB413410
CHECKING THE SHIFT DRUM ASSEMBLY

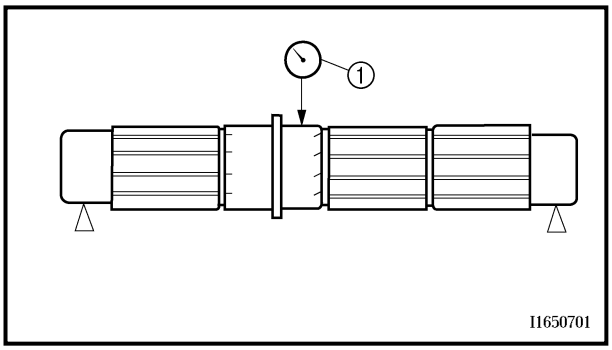
1. Check:
 - shift drum grooves
 Damage/scratches/wear → Replace the shift drum assembly.
 - shift drum segment ①
 Damage/wear → Replace the shift drum assembly.
 - shift drum bearing ②
 Damage/pitting → Replace the shift drum assembly.



EB413422
CHECKING THE TRANSMISSION

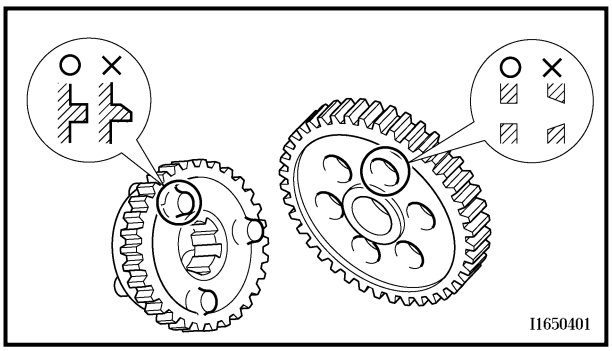
1. Measure:
 - main axle runout
 (with a centering device and dial gauge ①)
 Out of specification → Replace the main axle.

	Max. main axle runout **0.08 mm**



2. Measure:
 - drive axle runout
 (with a centering device and dial gauge ①)
 Out of specification → Replace the drive axle.

	Max. drive axle runout **0.08 mm**



3. Check:
 - transmission gears
 Blue discoloration/pitting/wear → Replace the defective gear(-s).
 - transmission gear dogs
 Cracks/damage/rounded edges → Replace the defective gear(-s).

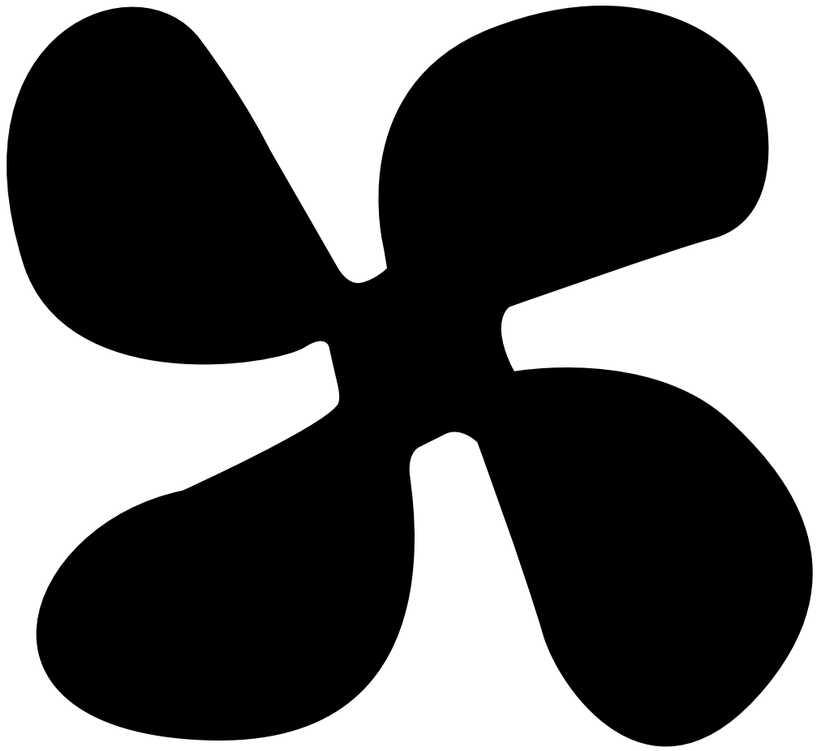
4. Check:
 • transmission gear engagement
 (each pinion gear to its respective wheel gear)
 Incorrect → Reassemble the transmission axle assemblies.
5. Check:
 • transmission gear movement
 Rough movement → Replace the defective part(-s).
6. Check:
 • circlips
 Bends/damage/looseness → Replace.

INSTALLING THE TRANSMISSION

1. Install:
 • main axle assembly
 • shift fork "C"
 • shift drum assembly
 • shift fork "R"
 • shift fork "L"
 • springs
 • shift fork guide bars
 • drive axle assembly

 NOTE:
 • Carefully position the shift forks so that they are installed correctly into the transmission gears.
 • Install shift fork "C" into the groove in the 3rd and 4th pinion gear on the main axle.
 • Install shift fork "L" into the groove in the 6th wheel gear and shift fork "R" into the groove in the 5th wheel gear on the drive axle.
 • Make sure that the drive axle bearing circlip is inserted into the grooves in the upper crankcase.
2. Check:
 • transmission
 Rough movement → Repair.

 NOTE:
 Oil each gear, shaft, and bearing thoroughly.



COOL 5

CHAPTER 5.
COOLING SYSTEM

RADIATOR 5-1
CHECKING THE RADIATOR 5-3
INSTALLING THE RADIATOR 5-4

OIL COOLER 5-5
CHECKING THE OIL COOLER 5-6
INSTALLING THE OIL COOLER 5-6

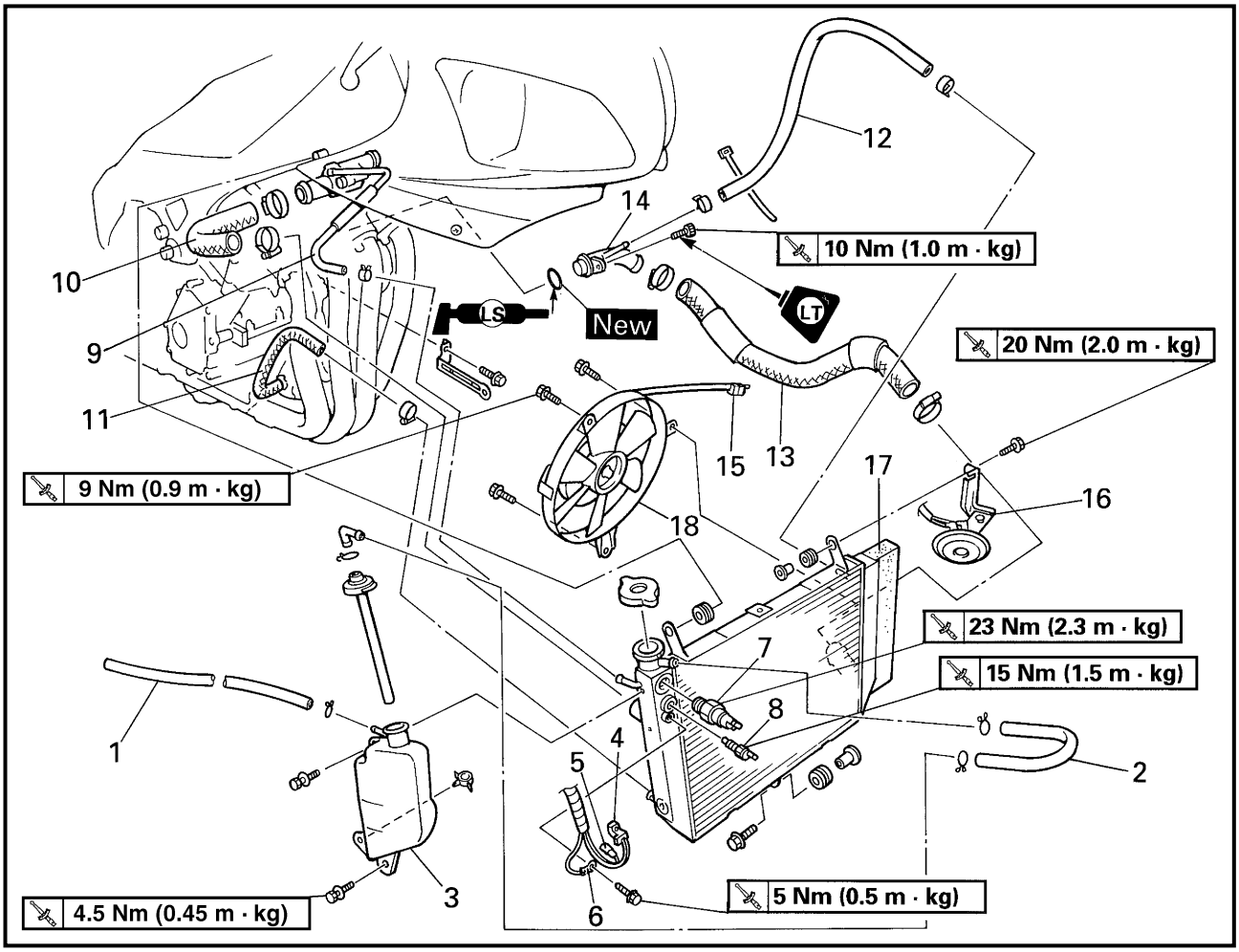
THERMOSTAT ASSEMBLY 5-8
CHECKING THE THERMOSTAT 5-11
ASSEMBLING THE THERMOSTAT ASSEMBLY 5-11
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WATER PUMP 5-13
DISASSEMBLING THE WATER PUMP 5-15
CHECKING THE WATER PUMP 5-15
ASSEMBLING THE WATER PUMP 5-16

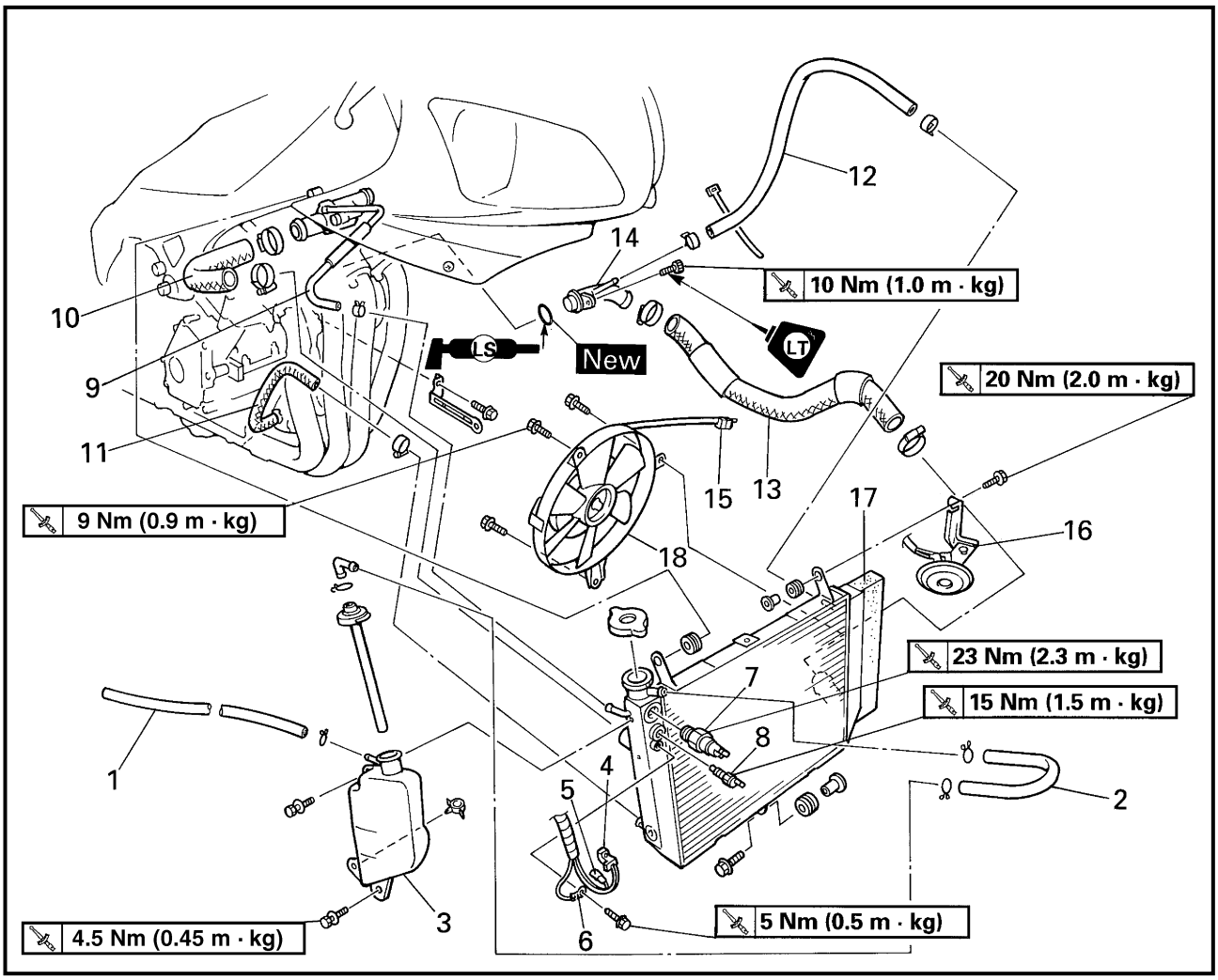
EB500000

COOLING SYSTEM

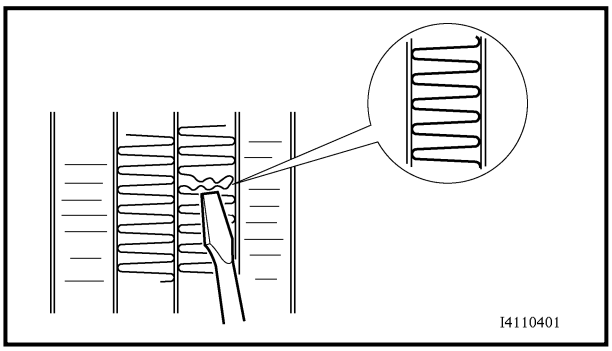
RADIATOR



Order	Job/Part	Q'ty	Remarks
	Removing the radiator		Remove the parts in the order listed.
	Rider seat and fuel tank		Refer to "SEATS" and "FUEL TANK" in chapter 3.
	Air filter case and rubber cover		Refer to "AIR FILTER CASE AND IGNITION COIL PLATE" in chapter 3.
	Bottom cowling and side cowlings		Refer to "COWLINGS" in chapter 3.
	Drive sprocket cover		Refer to "ENGINE" in chapter 4.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
1	Coolant reservoir breather hose	1	
2	Coolant reservoir hose	1	
3	Coolant reservoir	1	
4	Thermo switch coupler	1	Disconnect.
5	Temperature sender connector	1	Disconnect.
6	Ground lead	1	Disconnect.



Order	Job/Part	Q'ty	Remarks
7	Thermo switch	1	
8	Temperature sender	1	
9	Thermostat assembly breather hose	1	Disconnect.
10	Radiator inlet hose	1	
11	Oil cooler outlet hose	1	Disconnect.
12	Water pump breather hose	1	
13	Radiator outlet hose	1	
14	Water pump inlet pipe	1	
15	Radiator fan motor coupler	1	Disconnect.
16	Horn bracket	1	
17	Radiator	1	
18	Radiator fan	1	
			For installation, reverse the removal procedure.

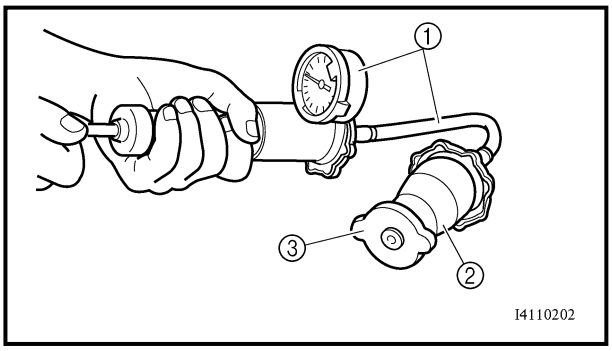


EB500010
CHECKING THE RADIATOR

1. Check:
 • radiator fins
 Obstruction → Clean.
 Apply compressed air to the rear of the radiator.
 Damage → Repair or replace.

NOTE:
Straighten any flattened fins with a thin, flat-head screwdriver.

2. Check:
 • radiator hoses
 Cracks/damage → Replace.



3. Measure:
 • radiator cap opening pressure
 Below the specified pressure → Replace the radiator cap.

Radiator cap opening pressure
95 ~ 125 kPa
(0.95 ~ 1.25 kg/cm², 0.95 ~ 1.25 bar)

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a. Install the radiator cap tester ① and adapter ② onto the radiator cap ③.

Radiator cap tester
90890-01325
Adapter
90890-01352

b. Apply the specified pressure for ten seconds and make sure that there is no drop in pressure.

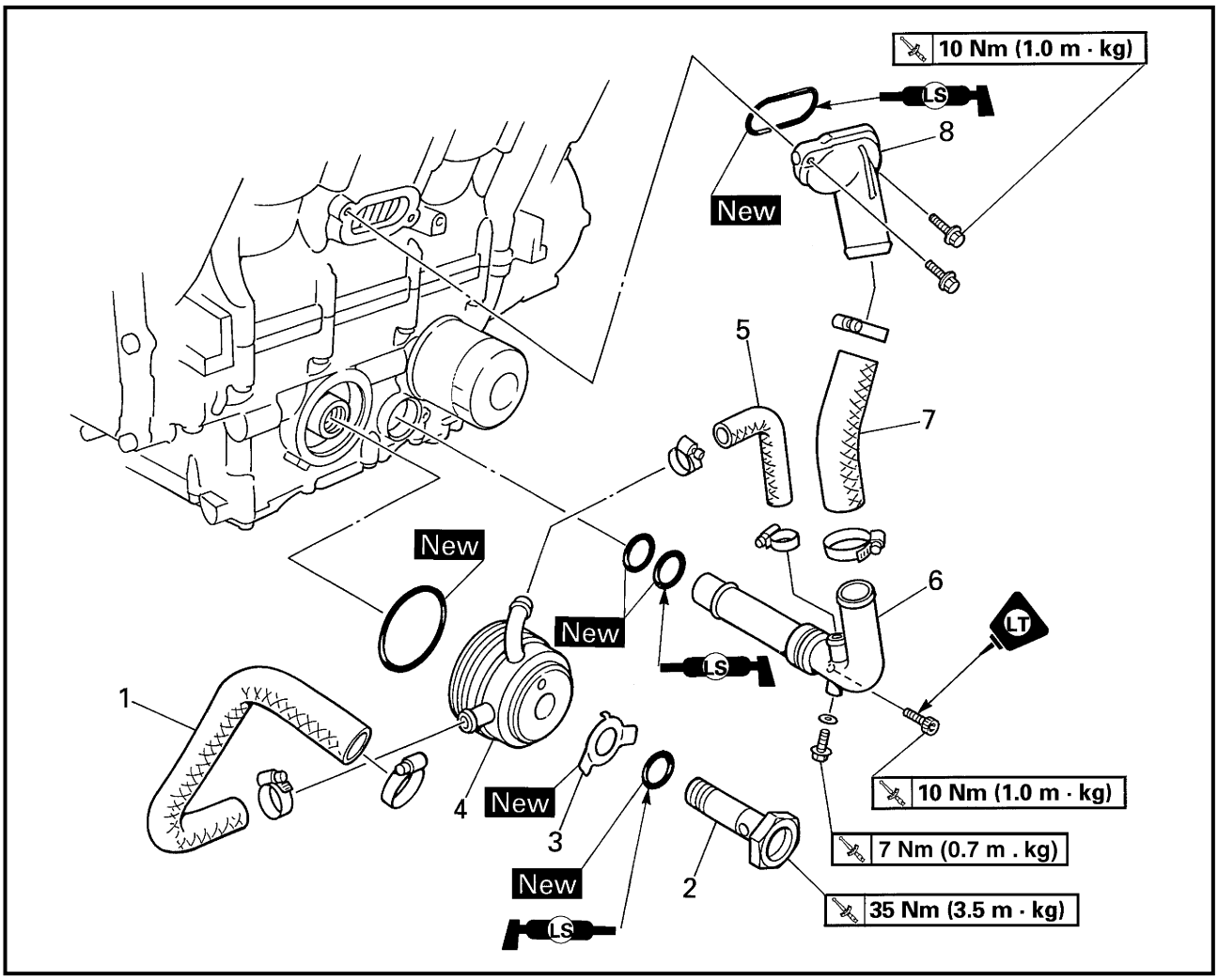
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4. Check:
 • radiator fan
 Damage → Replace.
 Malfunction → Check and repair.
 Refer to “COOLING SYSTEM” in chapter 8.

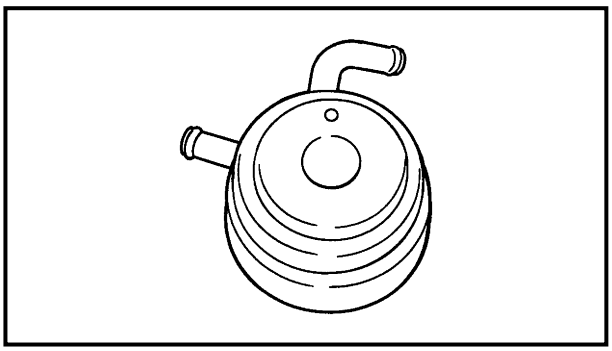
EB500020
INSTALLING THE RADIATOR

1. Fill:
 - cooling system
 (with the specified amount of the recommended coolant)
 Refer to "CHANGING THE COOLANT" in chapter 3.
2. Check:
 - cooling system
 Leaks → Repair or replace any faulty part.
3. Measure:
 - radiator cap opening pressure
 Below the specified pressure → Replace the radiator cap.
 Refer to "CHECKING THE RADIATOR".

EB501000
OIL COOLER



Order	Job/Part	Q'ty	Remarks
	Removing the oil cooler		Remove the parts in the order listed.
	Radiator assembly		Refer to "RADIATOR".
	Exhaust pipe assembly		Refer to "ENGINE" in chapter 4.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Oil cooler outlet hose	1	
2	Bolt	1	
3	Lock washer	1	
4	Oil cooler	1	
5	Oil cooler inlet hose	1	
6	Water pump outlet pipe	1	
7	Water jacket joint inlet hose	1	
8	Water jacket joint	1	
			For installation, reverse the removal procedure.

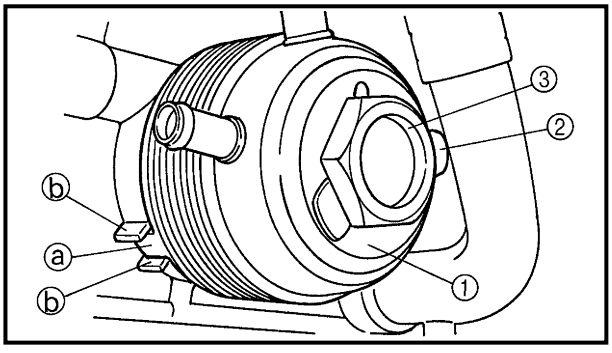


EB501010
CHECKING THE OIL COOLER

1. Check:
 • oil cooler
 Cracks/damage → Replace.
2. Check:
 • oil cooler inlet hose
 • oil cooler outlet hose
 Cracks/damage/wear → Replace.
3. Check:
 • water jacket joint
 • water jacket joint inlet hose
 • water pump outlet hose
 Cracks/damage → Replace.

EB501020
INSTALLING THE OIL COOLER

1. Clean:
 • mating surfaces of the oil cooler and the crankcase
 (with a cloth dampened with lacquer thinner)



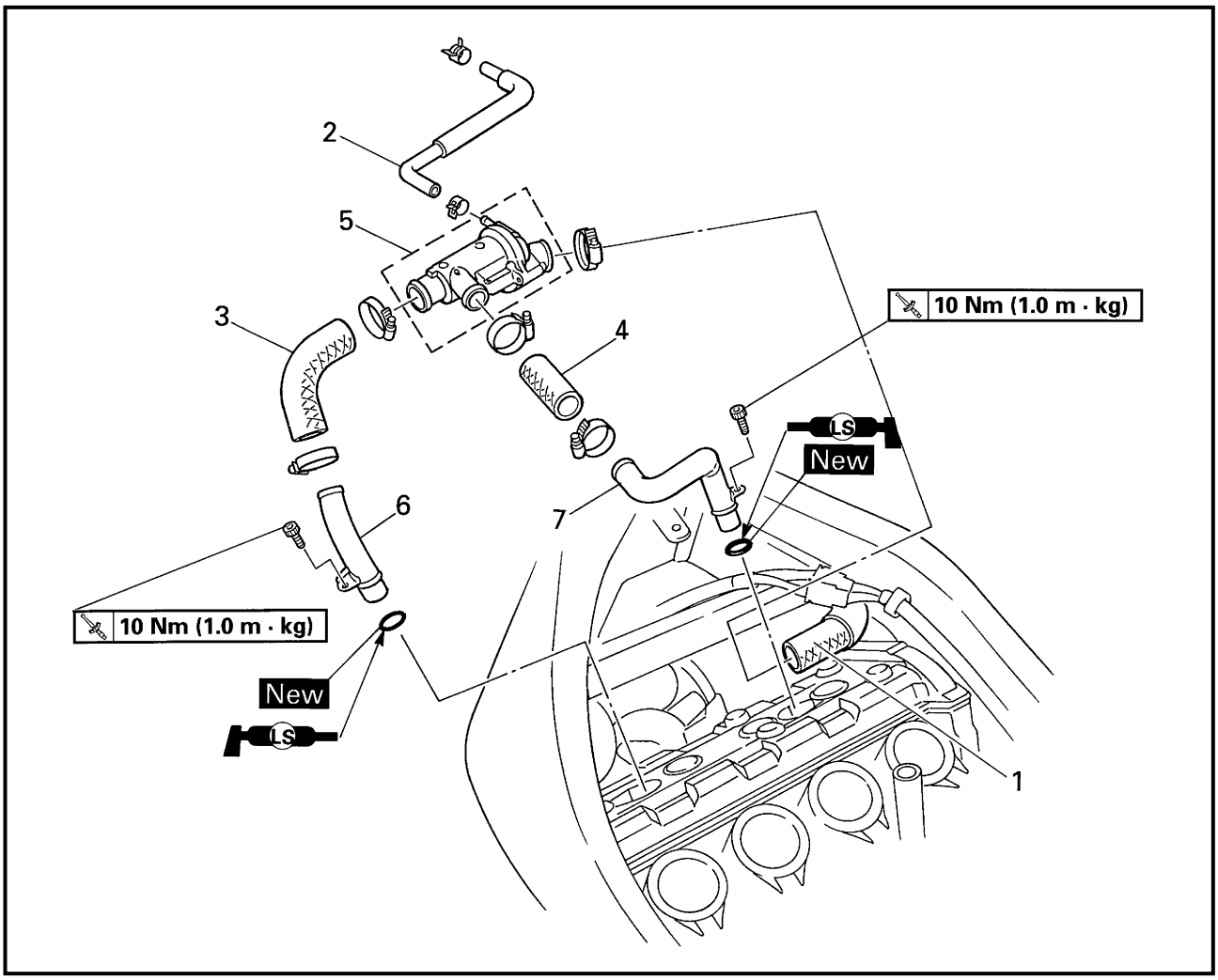
2. Install:
 • O-ring New
 • oil cooler ①
 • lock washer ② New
 • bolt ③ 35 Nm (3.5 m · kg)

NOTE:
- Before installing the oil cooler, lubricate the oil cooler bolt and O-ring with a thin coat of engine oil.
- Make sure that the O-ring is positioned properly.
- Align the projection ⓐ on the oil cooler with the slot ⓑ in the crankcase.

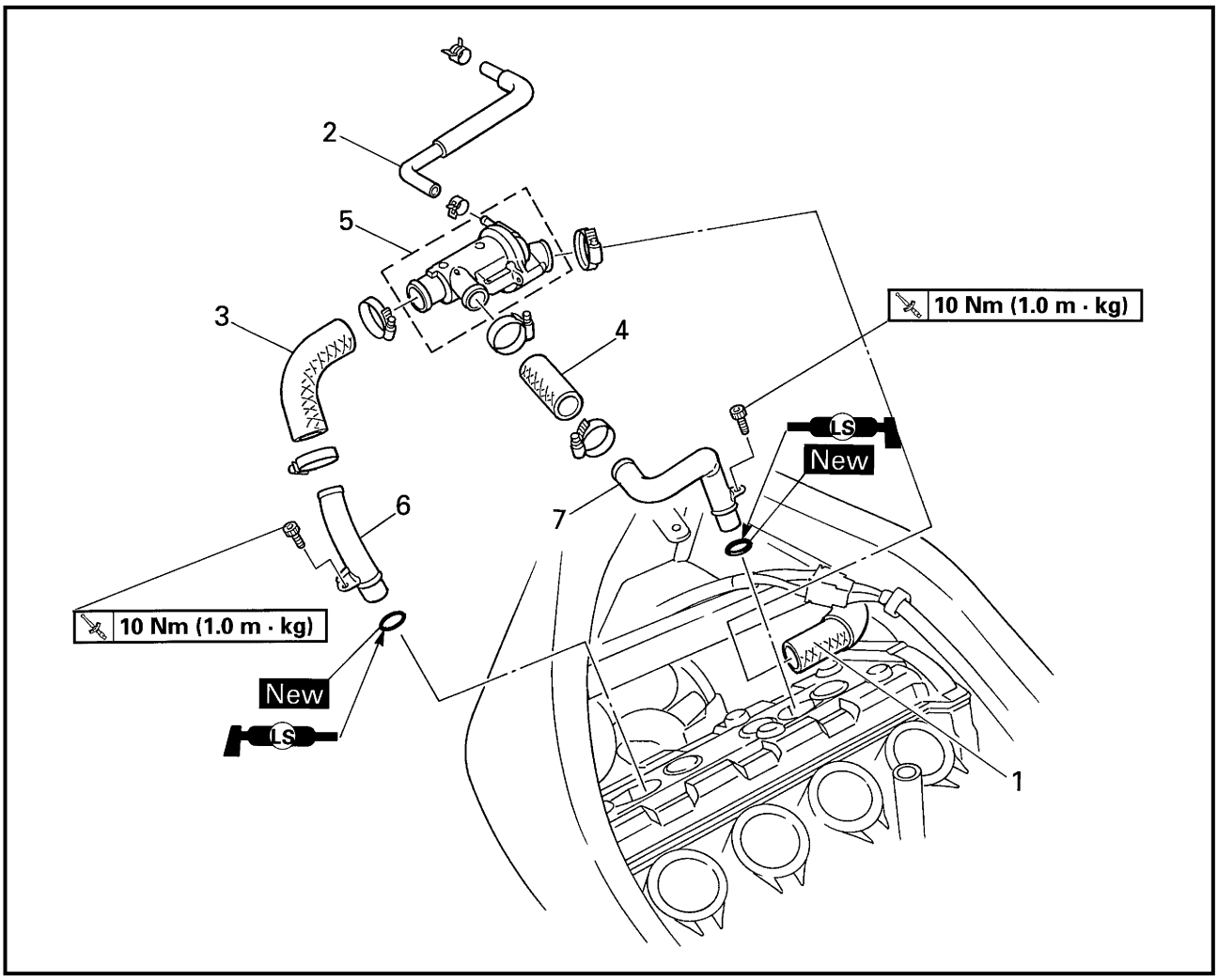
3. Bend the lock washer tab along a flat side of the bolt.

4. Fill:
 - cooling system
 (with the specified amount of the recommended coolant)
 Refer to “CHANGING THE COOLANT” in chapter 3.
 - crankcase
 (with the specified amount of the recommended engine oil)
 Refer to “CHANGING THE ENGINE OIL” in chapter 3.
5. Check:
 - cooling system
 Leaks → Repair or replace any faulty part.
6. Measure:
 - radiator cap opening pressure
 Below the specified pressure → Replace the radiator cap.
 Refer to “CHECKING THE RADIATOR”.

EB502000
THERMOSTAT ASSEMBLY

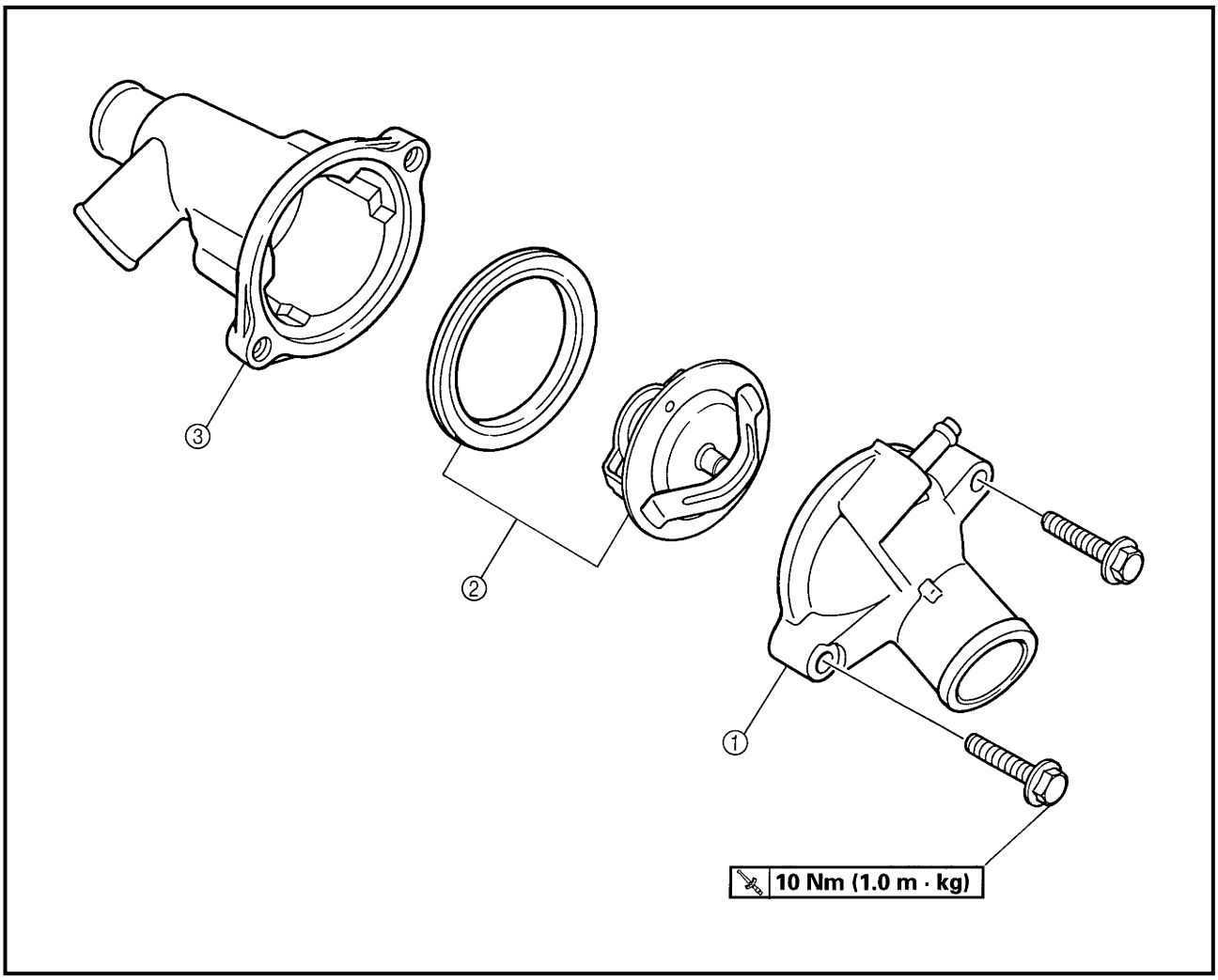


Order	Job/Part	Q'ty	Remarks
	Removing the thermostat assembly		Remove the parts in the order listed.
	Rider seat and fuel tank		Refer to "SEATS" and "FUEL TANK" in chapter 3.
	Air filter case and rubber cover		Refer to "AIR FILTER CASE AND IGNITION COIL PLATE" in chapter 3.
	Carburetor assembly		Refer to "CARBURETORS" in chapter 6.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
1	Radiator inlet hose	1	Disconnect.
2	Thermostat assembly breather hose	1	
3	Thermostat assembly inlet hose (left)	1	
4	Thermostat assembly inlet hose (right)	1	

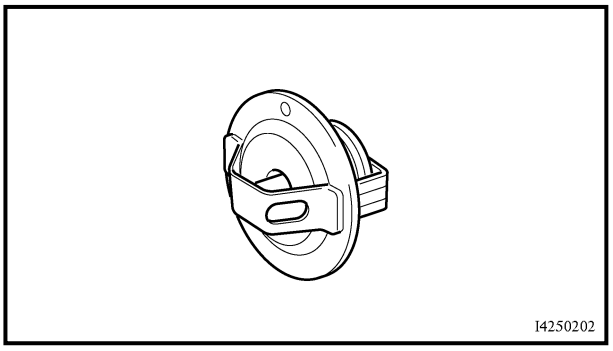


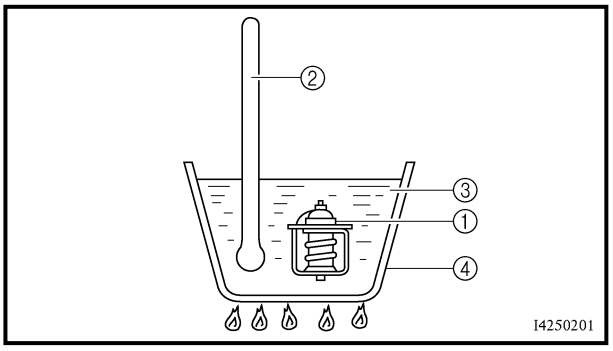
Order	Job/Part	Q'ty	Remarks
5	Thermostat assembly	1	
6	Thermostat assembly inlet pipe (left)	1	
7	Thermostat assembly inlet pipe (right)	1	
			For installation, reverse the removal procedure.

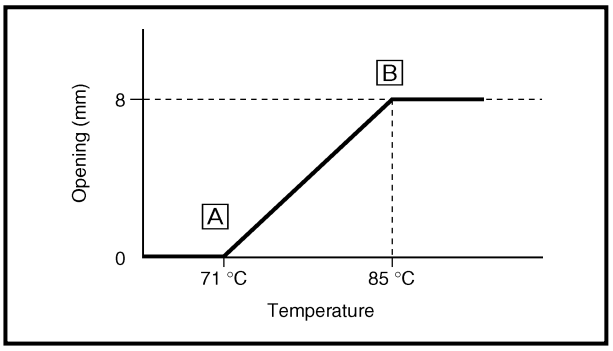
EB502010

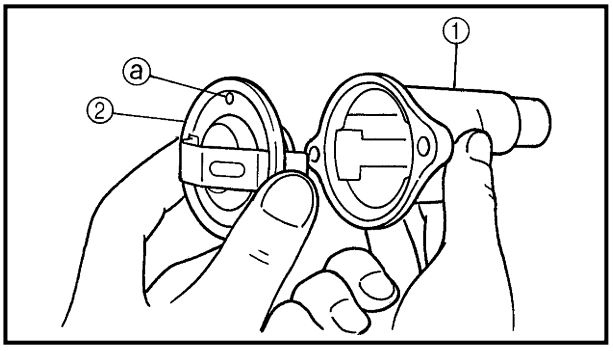


Order	Job/Part	Q'ty	Remarks
	Disassembling the thermostat assembly		Remove the parts in the order listed.
①	Thermostat housing cover	1	
②	Thermostat	1	
③	Thermostat housing	1	
			For assembly, reverse the disassembly procedure.









EB502020
CHECKING THE THERMOSTAT

1. Check:
 • thermostat ①
 Does not open at 71 ~ 85 °C → Replace.

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a. Suspend the thermostat in a container filled with water.

b. Slowly heat the water.

c. Place a thermometer in the water.

d. While stirring the water, observe the thermostat and thermometer's indicated temperature.

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① Thermostat
② Thermometer
③ Water
④ Container
A Fully closed
B Fully open

NOTE:
If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.

2. Check:
 • thermostat housing cover
 • thermostat housing
 Cracks/damage → Replace.

EB502030
ASSEMBLING THE THERMOSTAT ASSEMBLY

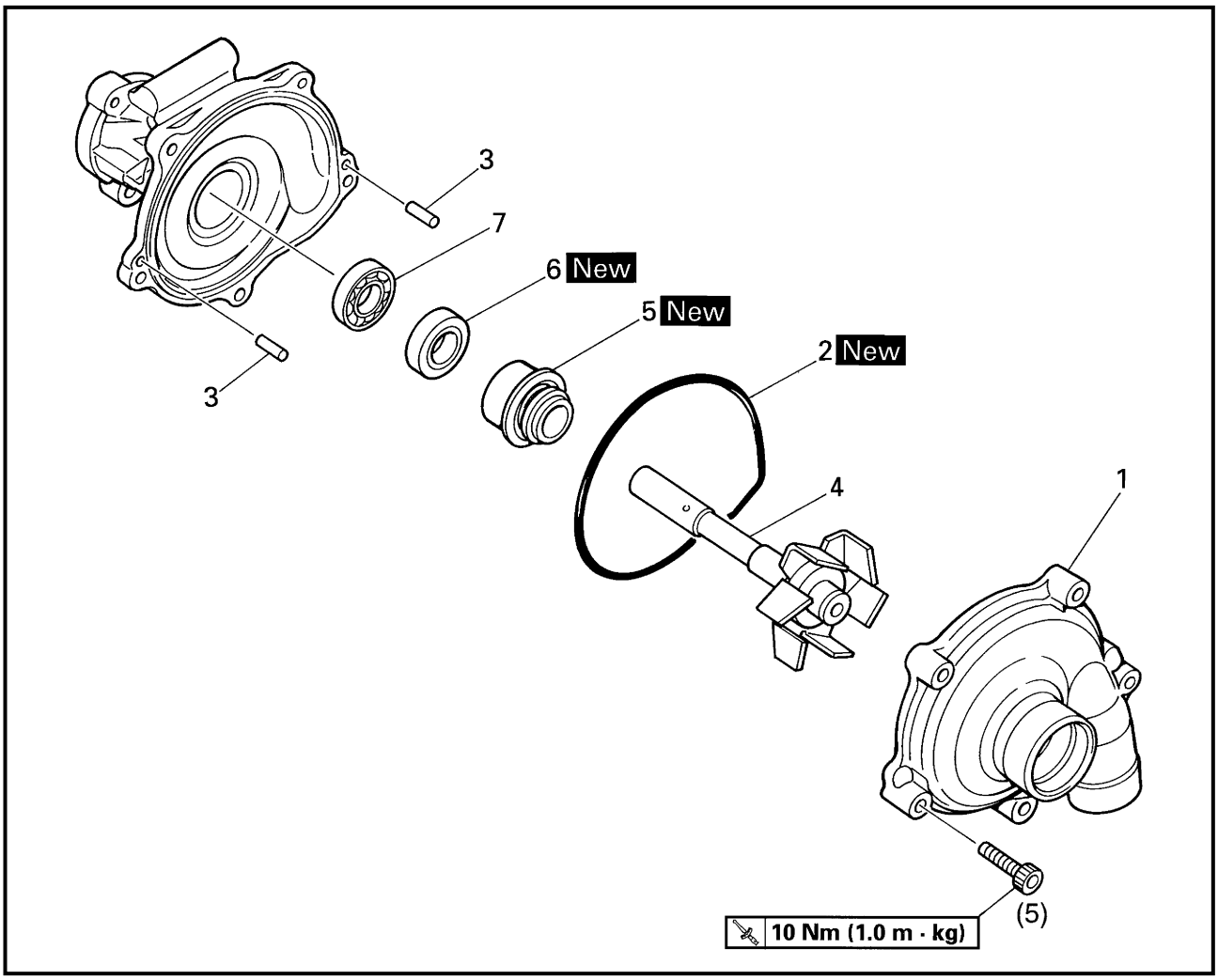
1. Install:
 • thermostat housing ①
 • thermostat ②
 • thermostat housing cover

NOTE:
Install the thermostat with its breather hole ⓐ facing up.

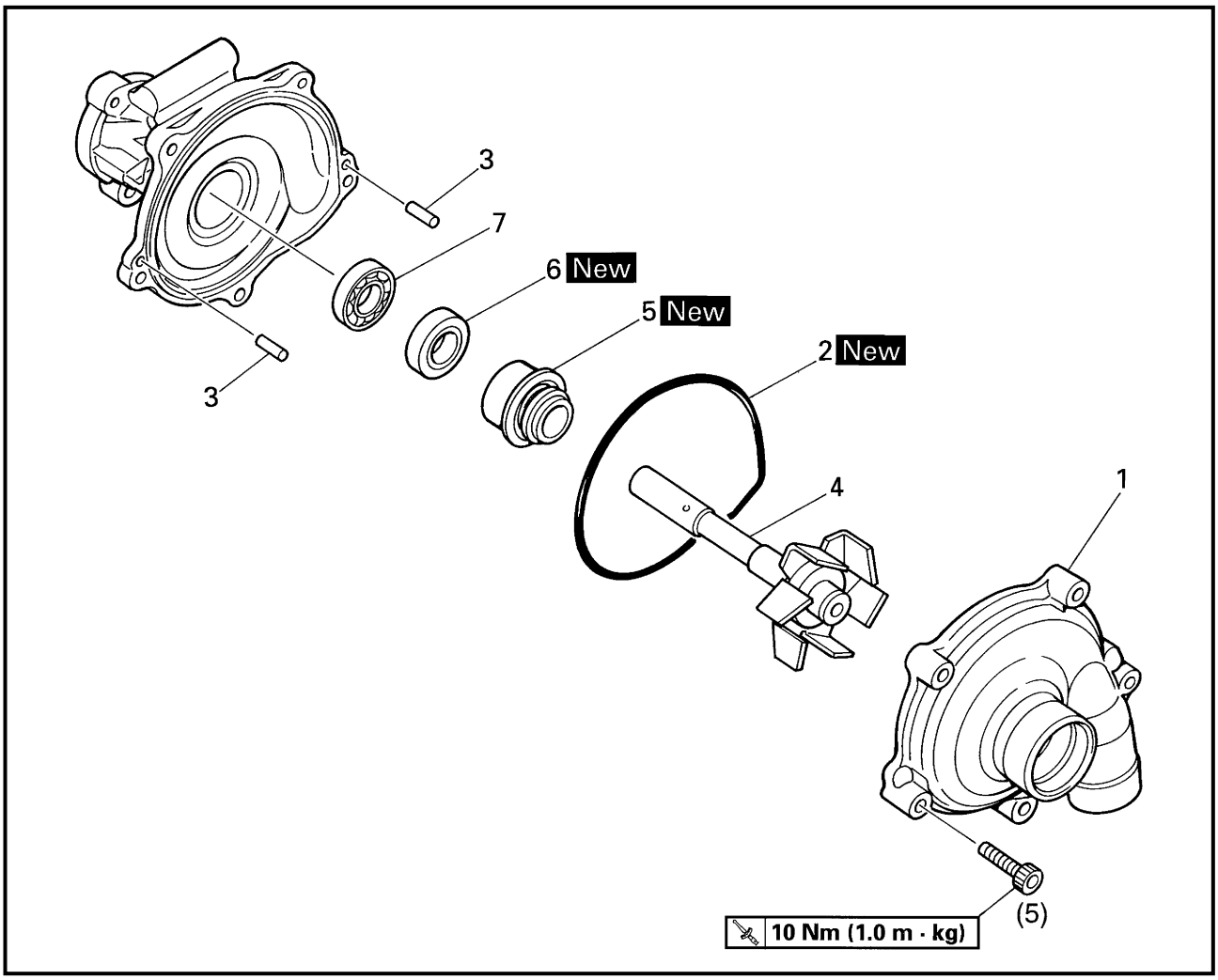
EB502040
INSTALLING THE THERMOSTAT ASSEMBLY

1. Fill:
 - cooling system
 (with the specified amount of the recommended coolant)
 Refer to "CHANGING THE COOLANT" in chapter 3.
2. Check:
 - cooling system
 Leaks → Repair or replace any faulty part.
3. Measure:
 - radiator cap opening pressure
 Below the specified pressure → Replace the radiator cap.
 Refer to "CHECKING THE RADIATOR".

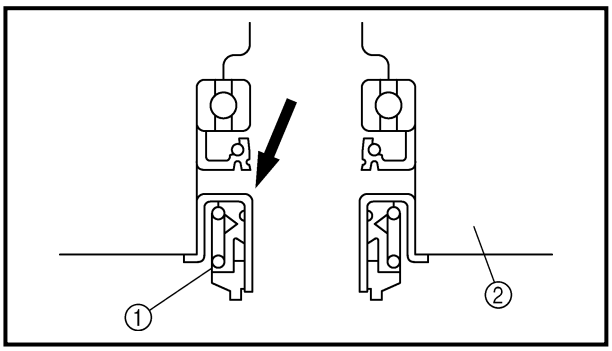
EB503000
WATER PUMP



Order	Job/Part	Q'ty	Remarks
	Removing the impeller shaft		Remove the parts in the order listed. **NOTE:** • The water pump and oil pump are combined into one unit (oil/water pump assembly). • It is not necessary to remove the impeller shaft unless the coolant level is extremely low or coolant leaks from the oil pan.
	Oil/water pump assembly and oil pump rotor		Refer to "OIL PAN AND OIL PUMP" in chapter 4.
1	Water pump cover	1	
2	O-ring	1	
3	Pin	2	
4	Impeller shaft (along with the impeller)	1	



Order	Job/Part	Q'ty	Remarks
5	Water pump seal	1	
6	Oil seal	1	
7	Bearing	1	
			For installation, reverse the removal procedure.

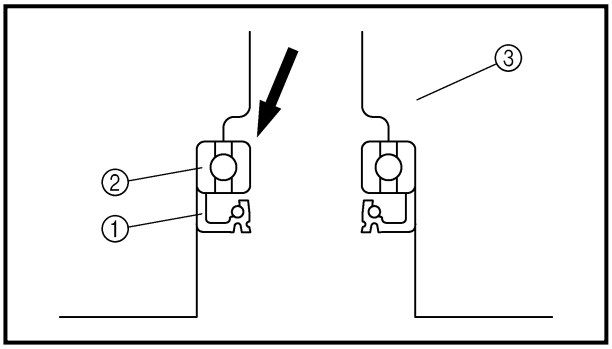


EB503020
DISASSEMBLING THE WATER PUMP

1. Remove:
 • water pump seal ①

NOTE:
Tap out the water pump seal from the inside of the water pump housing.

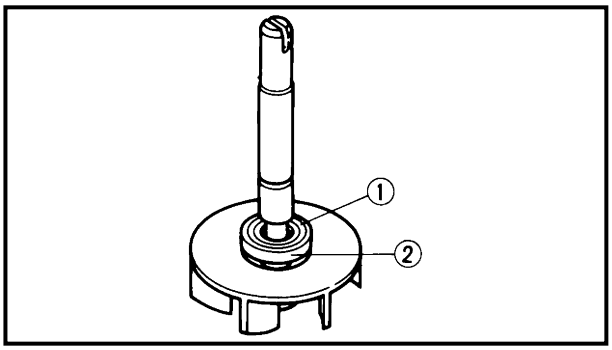
② Water pump housing



2. Remove:
 • oil seal ①
 • bearing ②

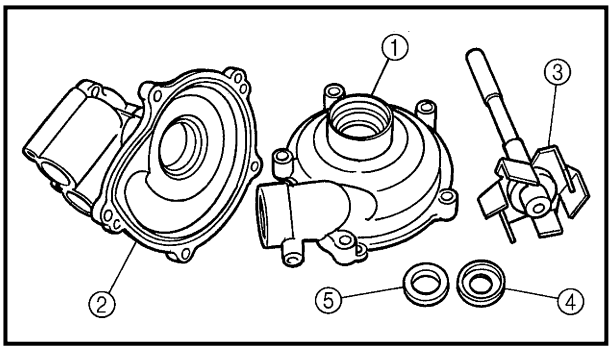
NOTE:
Tap out the bearing and oil seal from the outside of the water pump housing.

③ Water pump housing



3. Remove:
 • rubber damper holder ①
 • rubber damper ②
 (from the impeller, with a thin, flat-head screwdriver)

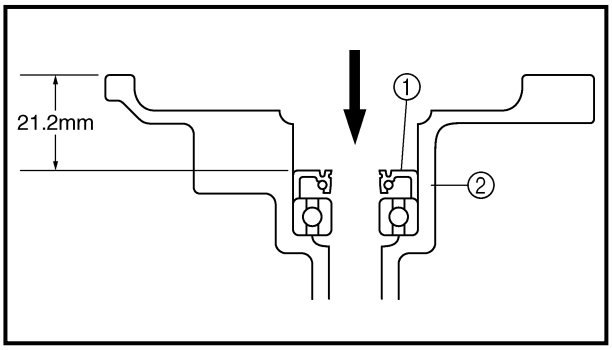
NOTE:
Do not scratch the impeller shaft.



EB503032
CHECKING THE WATER PUMP

1. Check:
 • water pump housing cover ①
 • water pump housing ②
 • impeller ③
 • rubber damper ④
 • rubber damper holder ⑤
 Cracks/damage/wear → Replace.

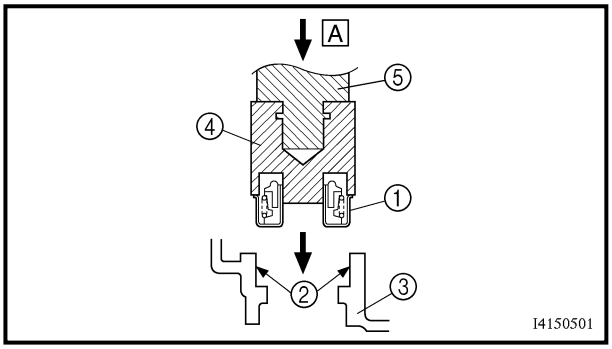
2. Check:
 • water pump seal
 • oil seal
 • water pump inlet pipe
 Cracks/damage/wear → Replace.
 • bearing
 Rough movement → Replace.



EB503040
ASSEMBLING THE WATER PUMP

1. Install:
 • oil seal ① New
 (into the water pump housing ②)

NOTE:
• Before installing the oil seal, apply tap water or coolant onto its outer surface.
• Install the oil seal with a socket that matches its outside diameter.



2. Install:
 • water pump seal ① New

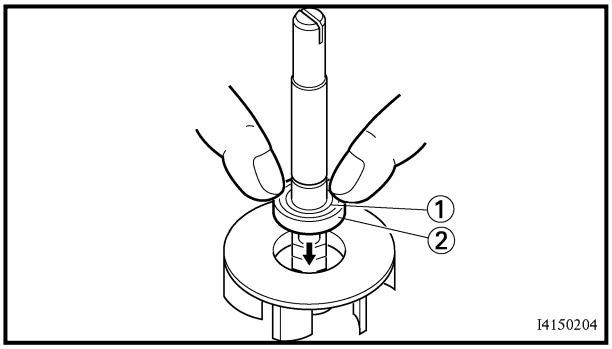
CAUTION:
Never lubricate the water pump seal surface with oil or grease.

NOTE:
• Install the water pump seal with the special tools.
• Before installing the water pump seal, apply Yamaha bond No.1215 ② to the water pump housing ③.



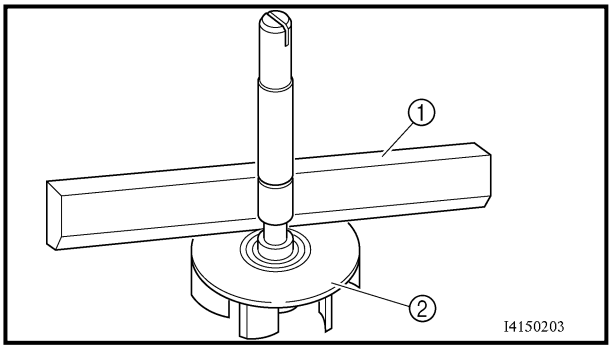
Mechanical seal installer ④
90890-04078
Middle driven shaft bearing driver ⑤
90890-04058
Yamaha bond No. 1215
90890-85505

A Push down.



3. Install:
 • rubber damper ① New
 • rubber damper holder ② New

NOTE:
Before installing the rubber damper, apply tap water or coolant onto its outer surface.



4. Measure:
 • impeller shaft tilt
 Out of specification → Repeat steps (3) and (4).

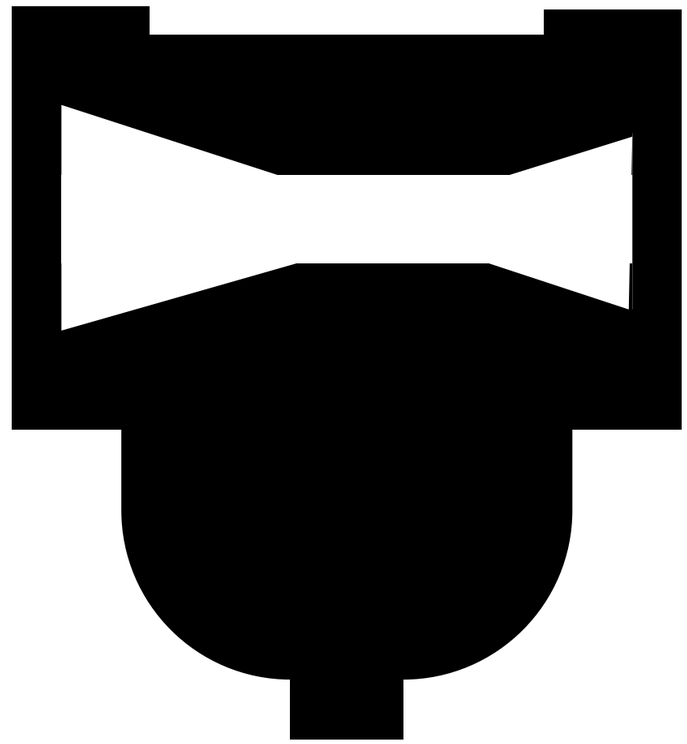
CAUTION:

Make sure that the rubber damper and rubber damper holder are flush with the impeller.



Max. impeller shaft tilt
0.15 mm

① Straightedge
② Impeller



CARB 6

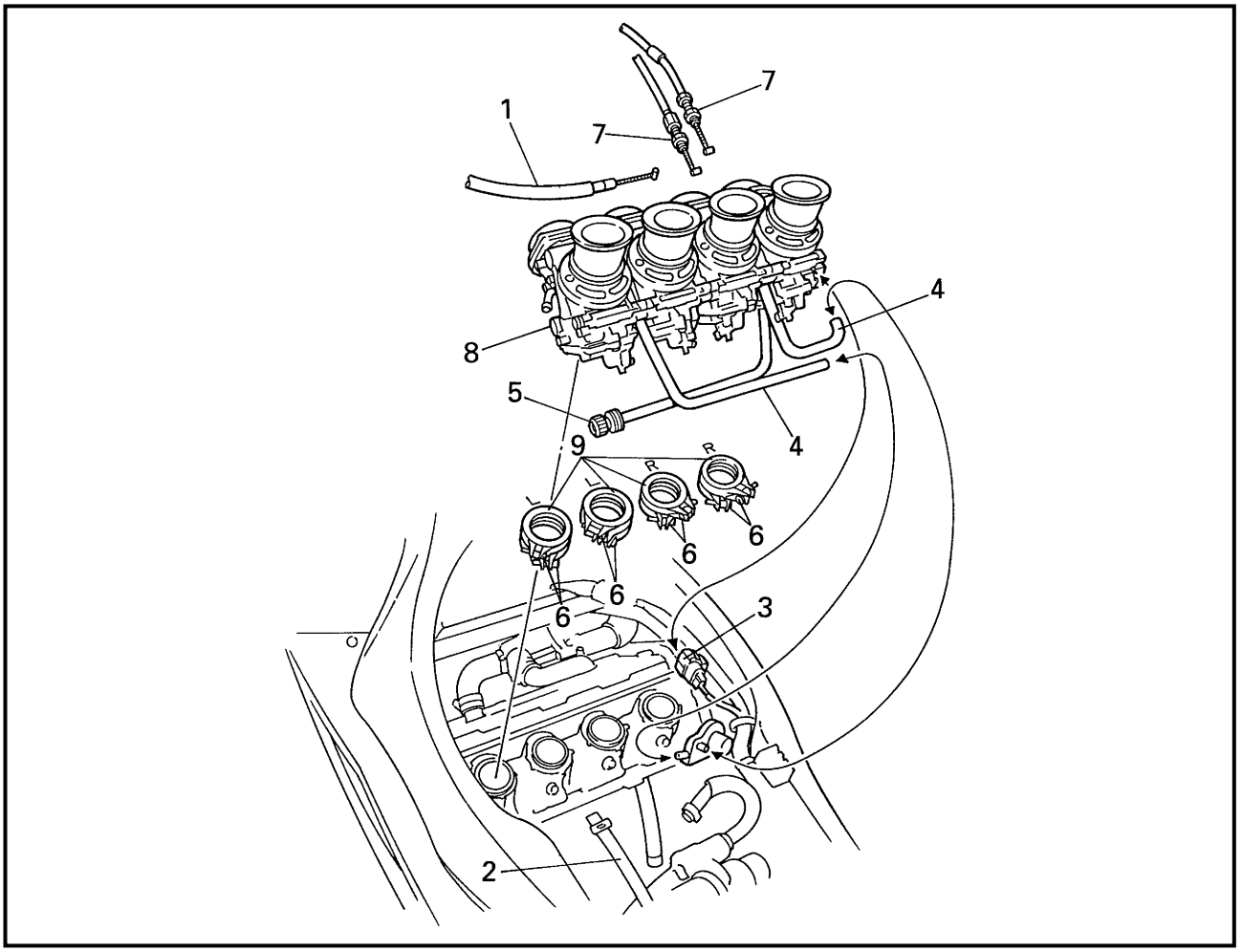
CHAPTER 6.
CARBURETORS

CARBURETORS 6-1
CHECKING THE CARBURETORS 6-6
ASSEMBLING THE CARBURETORS 6-8
INSTALLING THE CARBURETORS 6-10
MEASURING AND ADJUSTING THE FUEL LEVEL 6-11
CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR 6-12
CHECKING THE FUEL PUMP 6-15

EB600001

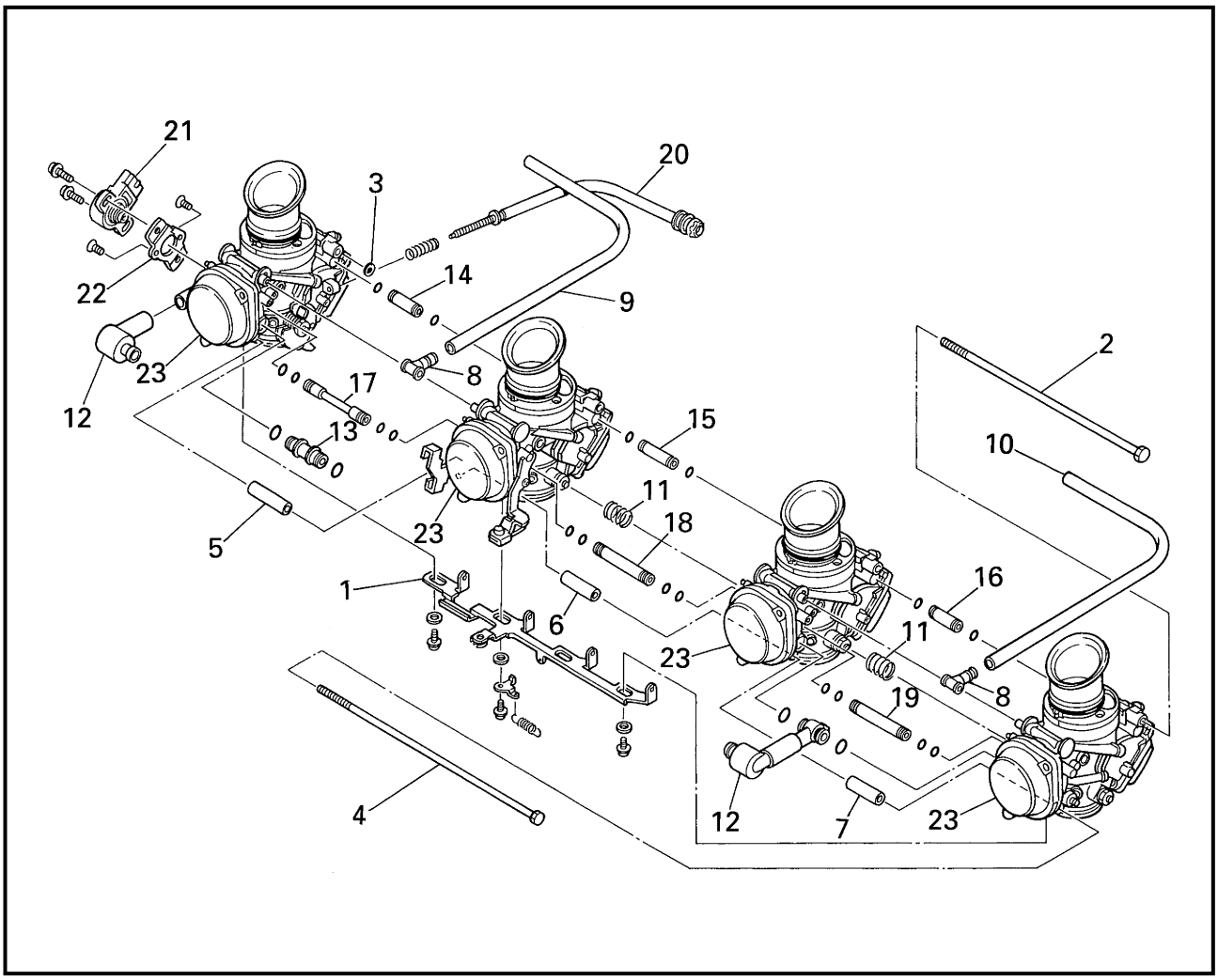
CARBURETORS

CARBURETORS

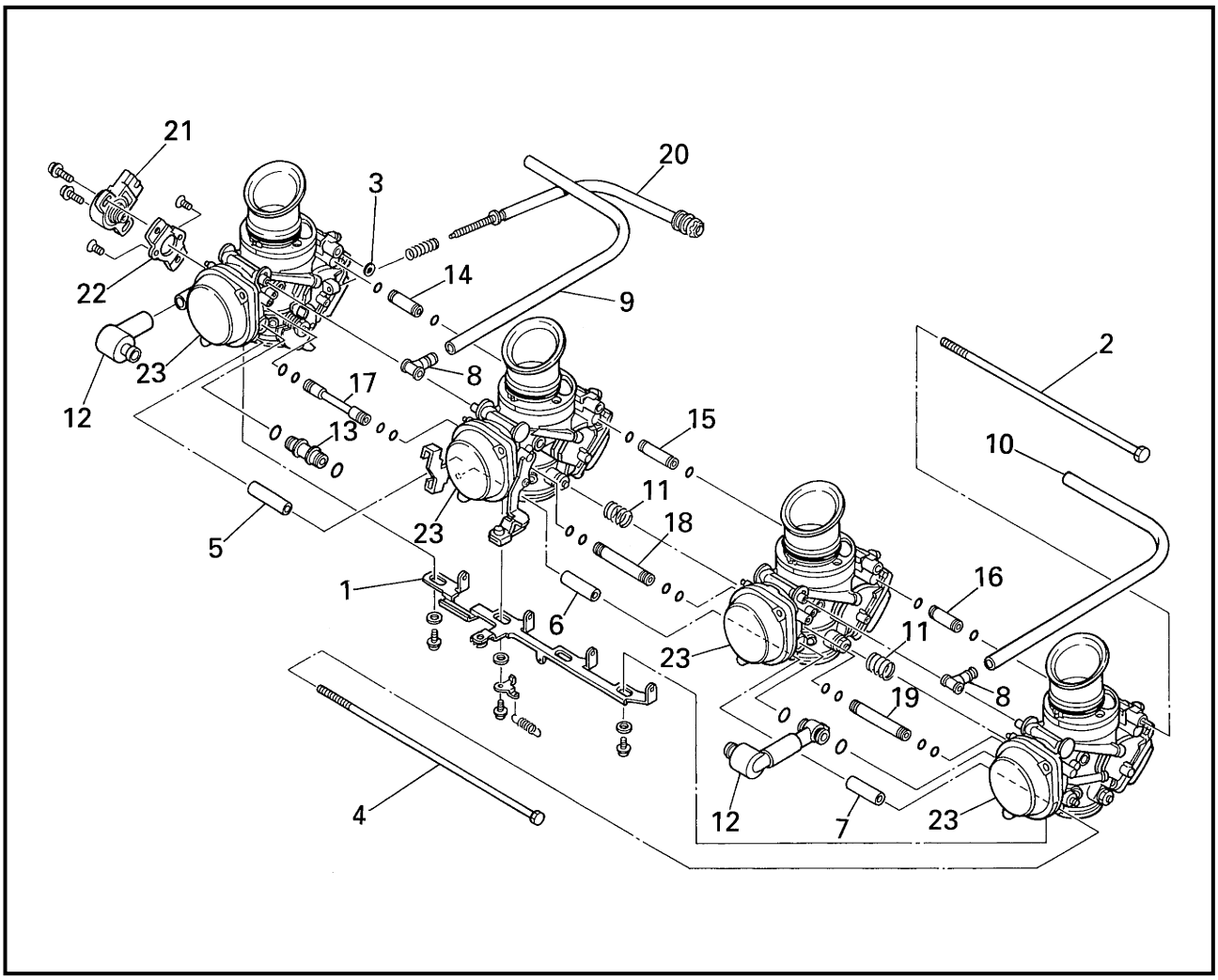


Order	Job/Part	Q'ty	Remarks
	Removing the carburetors		Remove the parts in the order listed.
	Rider seat and fuel tank		Refer to "SEATS" and "FUEL TANK" in chapter 3.
	Air filter case and rubber baffle		Refer to "AIR FILTER CASE AND IGNITION COIL PLATE" in chapter 3.
1	Starter cable	1	
2	Fuel hose	1	
3	Throttle position sensor coupler	1	Disconnect.
4	Float chamber air vent hose	2	
5	Throttle stop screw	1	
6	Carburetor joint clamp screw	8	
7	Throttle cable	2	
8	Carburetor assembly	1	
9	Carburetor joint	4	
			For installation, reverse the removal procedure.

EB600010

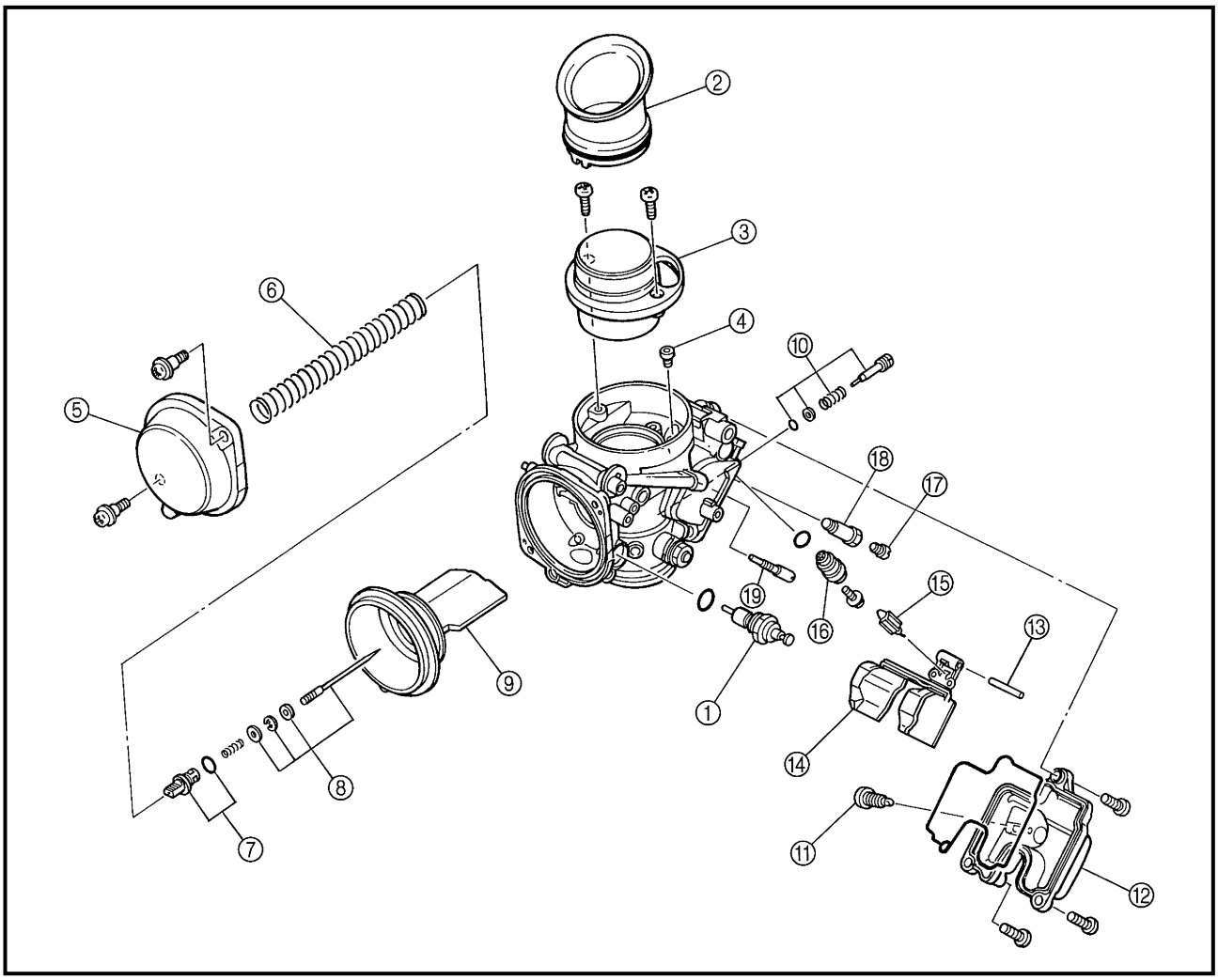


Order	Job/Part	Q'ty	Remarks
	Separating the carburetors		Remove the parts in the order listed.
1	Starter plunger link	1	
2	Connecting bolt	1	ℓ = 245 mm
3	Copper washer	1	
4	Connecting bolt	1	ℓ = 270 mm
5	Spacer	1	ℓ = 43 mm
6	Spacer	1	ℓ = 38 mm
7	Spacer	1	ℓ = 36 mm
8	Hose joint	2	
9	Float chamber air vent hose	1	ℓ = 250 mm
10	Float chamber air vent hose	1	ℓ = 355 mm
11	Spring	2	
12	Vacuum chamber air vent hose	2	
13	Vacuum chamber pipe	1	

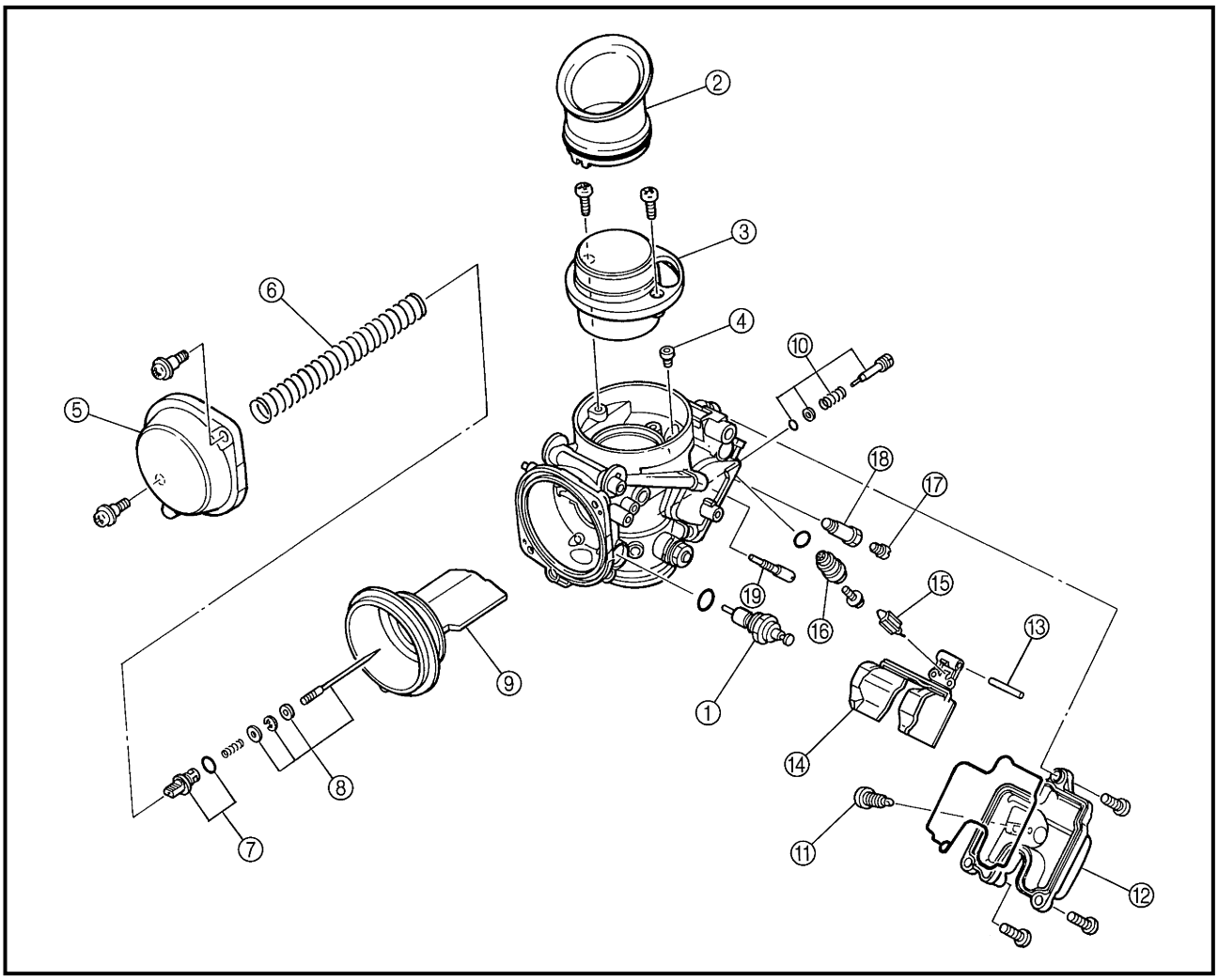


Order	Job/Part	Q'ty	Remarks
14	Fuel feed pipe	1	ℓ = 37 mm
15	Fuel feed pipe	1	ℓ = 32 mm
16	Fuel feed pipe	1	ℓ = 29 mm
17	Pipe	1	ℓ = 73 mm
18	Pipe	1	ℓ = 68 mm
19	Pipe	1	ℓ = 66 mm
20	Throttle stop screw	1	
21	Throttle position sensor	1	
22	Throttle position sensor bracket	1	
23	Carburetor	4	For installation, reverse the removal procedure.

EB600021



Order	Job/Part	Q'ty	Remarks
	Disassembling the carburetor		Remove the parts in the order listed. **NOTE:** The following procedure applies to all of the carburetors.
①	Starter plunger	1	
②	Air funnel	1	
③	Air funnel joint	1	
④	Pilot air jet	1	
⑤	Vacuum chamber cover	1	
⑥	Piston valve spring	1	
⑦	Jet needle holder	1	
⑧	Jet needle kit	1	
⑨	Piston valve	1	
⑩	Pilot screw	1	
⑪	Fuel drain bolt	1	

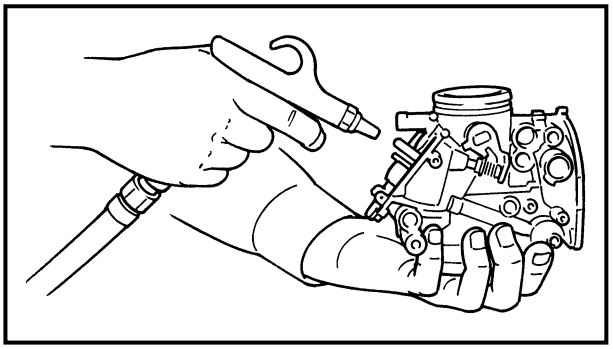


Order	Job/Part	Q'ty	Remarks
⑫	Float chamber	1	
⑬	Float pivot pin	1	
⑭	Float	1	
⑮	Needle valve	1	
⑯	Needle valve seat	1	
⑰	Main jet	1	
⑱	Main jet holder	1	
⑲	Pilot jet	1	
			For assembly, reverse the disassembly procedure.

EB600031
CHECKING THE CARBURETORS

The following procedure applies to all of the carburetors.

1. Check:
 - carburetor body
 - float chamber
 Cracks/damage → Replace.



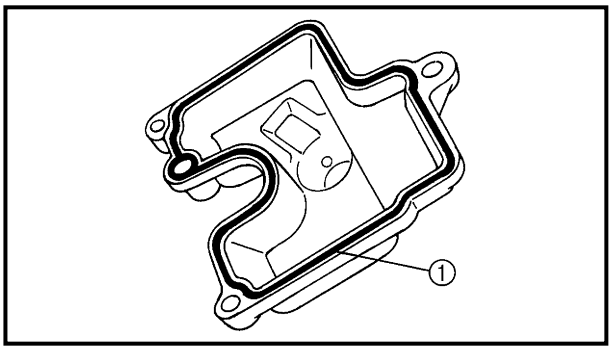
2. Check:
 - fuel passages
 Obstruction → Clean.

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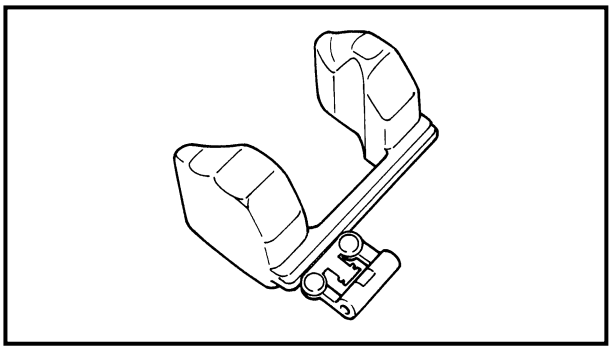
a. Wash the carburetor in a petroleum-based solvent. Do not use any caustic carburetor cleaning solution.

b. Blow out all of the passages and jets with compressed air.

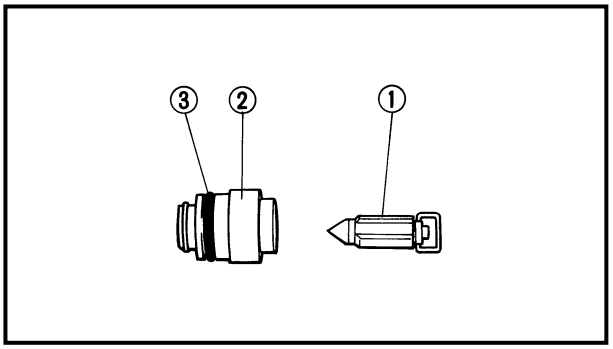
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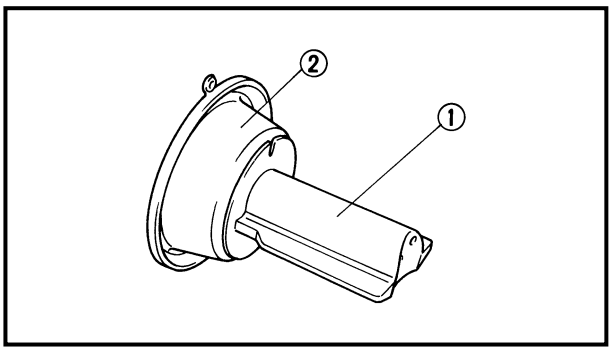
3. Check:
 - float chamber body
 Dirt → Clean.
4. Check:
 - float chamber rubber gasket ①
 Cracks/damage/wear → Replace.



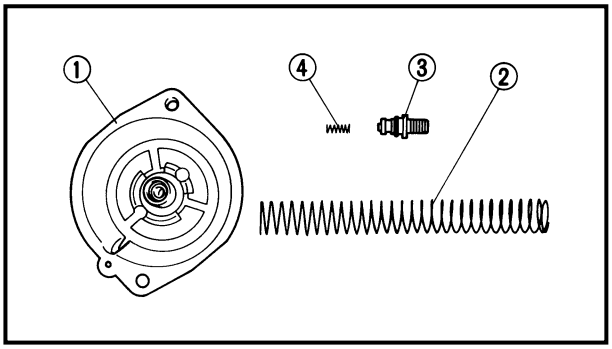
5. Check:
 - float
 Damage → Replace.



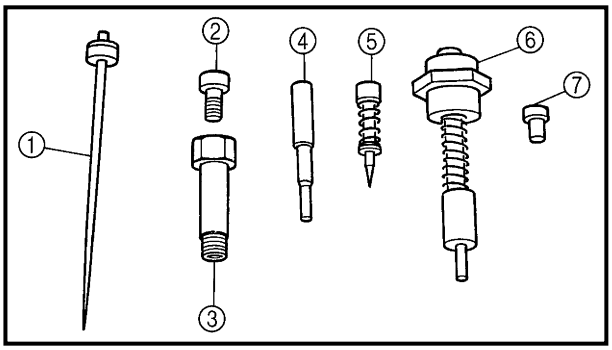
6. Check:
 - needle valve ①
 - needle valve seat ②
 Damage/obstruction/wear → Replace the needle valve, needle valve seat and O-ring as a set.
7. Check:
 - O-ring ③
 Damage/wear → Replace the needle valve, needle valve seat and O-ring as a set.



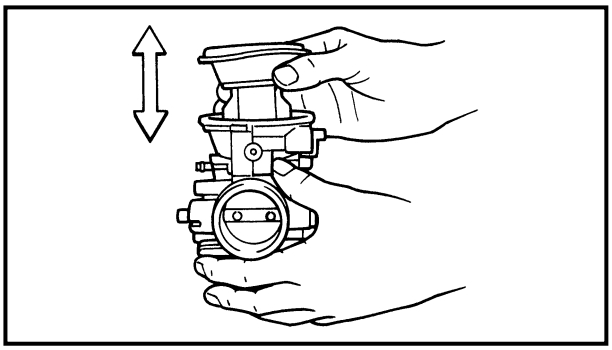
8. Check:
 - piston valve ①
 Damage/scratches/wear → Replace.
 - piston valve diaphragm ②
 Cracks/tears → Replace.



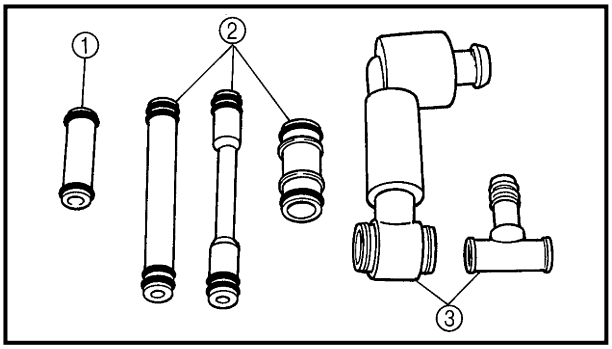
9. Check:
 - vacuum chamber cover ①
 - piston valve spring ②
 - jet needle holder ③
 - jet needle spring ④
 Cracks/damage → Replace.



10. Check:
 - jet needle kit ①
 - main jet ②
 - main jet holder ③
 - pilot jet ④
 - pilot screw ⑤
 - starter plunger ⑥
 - pilot air jet ⑦
 Bends/damage/wear → Replace.
 Obstruction → Clean.
 Blow out the jets with compressed air.



11. Check:
 - piston valve movement
 Insert the piston valve into the carburetor body and move it up and down.
 Tightness → Replace the piston valve.



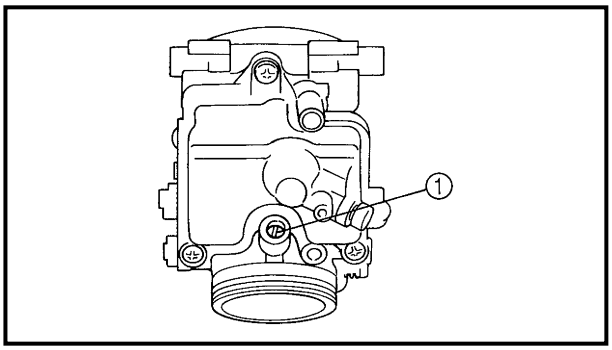
12. Check:
 - fuel feed pipes ①
 - pipes ②
 - hose joints ③
 Cracks/damage → Replace.
 Obstruction → Clean.
 Blow out the pipes with compressed air.

13. Check:
 - fuel hoses
 Cracks/damage/wear → Replace.
 Obstruction → Clean.
 Blow out the hoses with compressed air.

EB600043
ASSEMBLING THE CARBURETORS

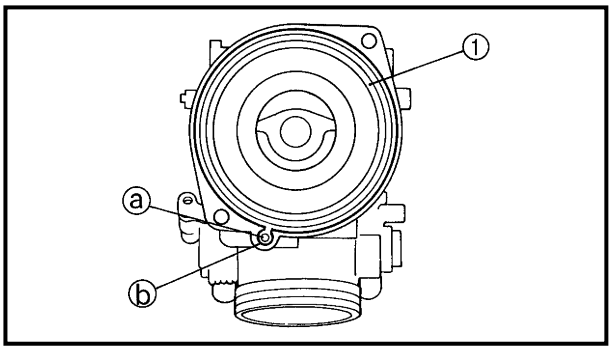
The following procedure applies to all of the carburetors.

CAUTION:
- **Before assembling the carburetors, wash all of the parts in a petroleum-based solvent.**
- **Always use a new gasket.**



1. Install:
 - pilot screw kit ①

Pilot screw setting
2-1/2 turns out

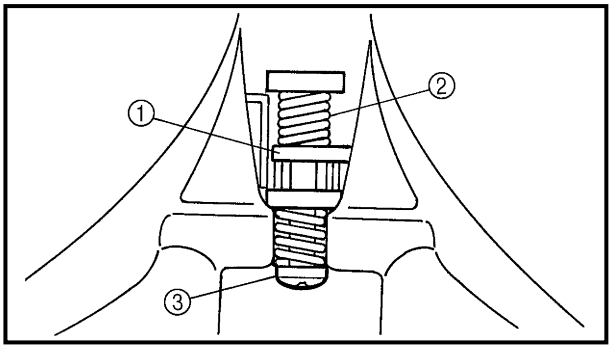


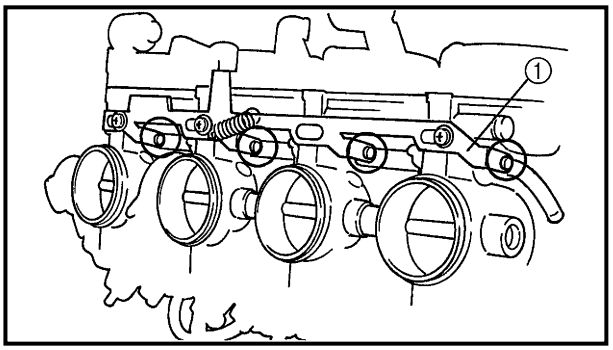
2. Install:
 - piston valve ①
 - jet needle
 - jet needle holder
 - piston valve spring
 - vacuum chamber cover

NOTE:
- Install the end of the piston valve spring onto the spring guide on the vacuum chamber cover.
- Align the tab ⓐ on the piston valve diaphragm with the recess ⓑ in the carburetor body.

3. Install:
 - pipes
 - fuel feed pipes
 - vacuum chamber pipe
 - vacuum chamber air vent hose
 - springs
 - float chamber air vent hoses
 - hose joints
 - spacers
 - copper washer
 - connecting bolts

NOTE:
- Do not tighten the connecting bolts, yet.
- Install the throttle valve lever ① onto carburetors #1, #2, and #4 between the spring ② and synchronizing screw ③.



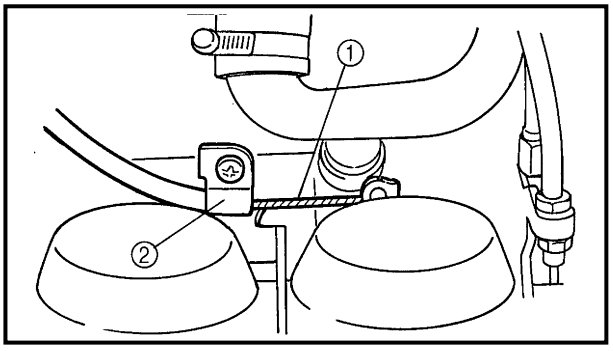


4. Install:
 - starter plunger link ①

NOTE:
Install the starter plunger link ① onto each starter plunger.

5. Tighten:
 - connecting bolts **7 Nm (0.7 m · kg)**

NOTE:
- Place the carburetor assembly on a surface plate with the intake manifold side down. Then, tighten the connecting bolts while pushing down the carburetor assembly with an even force.
- After tightening the connecting bolts, check that the throttle valve lever and starter plunger link operate smoothly.



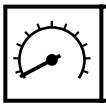
6. Install:
 - starter cable ①

NOTE:
Install the starter cable holder ② onto the starter cable.

EB600051
INSTALLING THE CARBURETORS

1. Adjust:
 • carburetor synchronization
 Refer to "SYNCHRONIZING THE CARBURETORS" in chapter 3.

2. Adjust:
 • engine idling speed



Engine idling speed
1,050 ~ 1,150 r/min

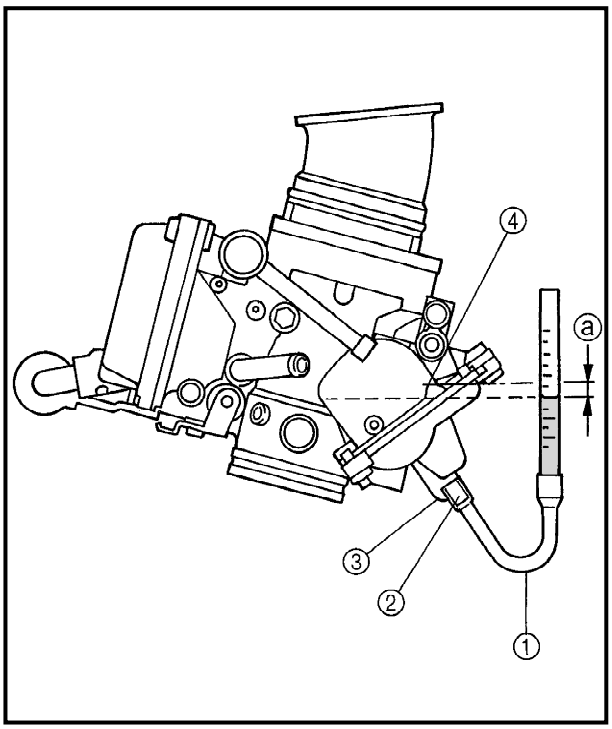
Refer to "ADJUSTING THE ENGINE IDLING SPEED" in chapter 3.

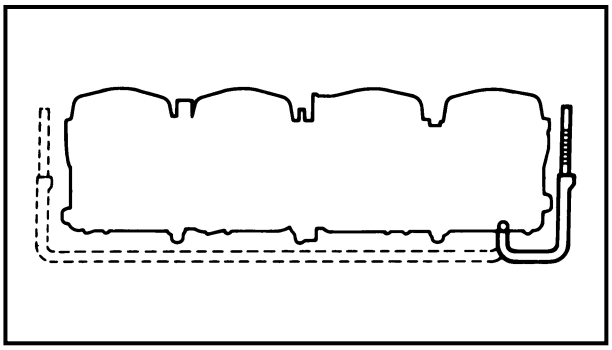
3. Adjust:
 • throttle cable free play

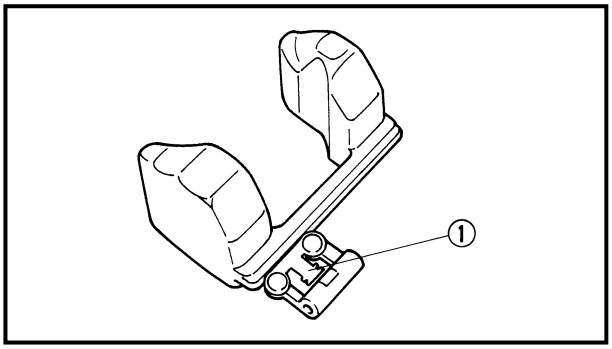


Throttle cable free play (at the flange of the throttle grip)
3 ~ 5 mm

Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY" in chapter 3.







EB600063

MEASURING AND ADJUSTING THE FUEL LEVEL

1. Measure:
 • fuel level ⓐ
 Out of specification → Adjust.

	Fuel level (below the line on the float chamber) **4.1 ~ 5.1 mm**

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a. Stand the motorcycle on a level surface.

b. Place the motorcycle on a suitable stand to ensure that the motorcycle is standing straight up.

c. Install the fuel level gauge ① onto the fuel drain pipe ②.

	Fuel level gauge **90890-01312**

d. Loosen the fuel drain bolt ③.

e. Hold the fuel level gauge vertically next to the line ④ on the float chamber.

f. Measure the fuel level ⓐ.

NOTE:
Fuel level readings should be equal on both sides of the carburetor assembly.

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2. Adjust:
 • fuel level

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Remove the carburetor assembly.

b. Check the needle valve seat and needle valve.

c. If either is worn, replace them as a set.

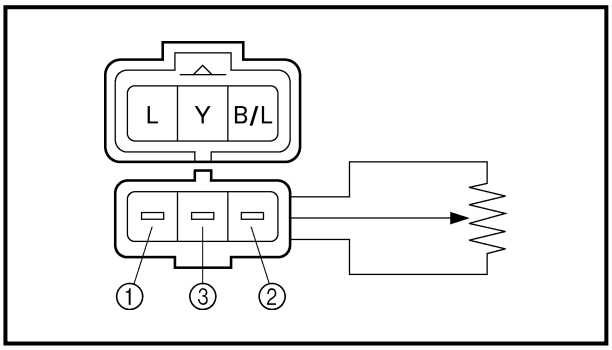
d. If both are fine, adjust the float level by slightly bending the float tang ①.

e. Install the carburetor assembly.

f. Measure the fuel level again.

g. Repeat steps (a) to (f) until the fuel level is within specification.

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EB600072
CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR

NOTE:
Before adjusting the throttle position sensor, the engine idling speed should be properly adjusted.

1. Check:
 • throttle position sensor
 (installed on the carburetor)

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a. Disconnect the throttle position sensor coupler.

b. Connect the pocket tester (Ω × 1k) to the throttle position sensor.

Tester positive probe → blue ①
Tester negative probe → black/blue ②

c. Measure the throttle position sensor maximum resistance.
Out of specification → Replace the throttle position sensor.

Throttle position sensor maximum resistance
4.0 ~ 6.0 kΩ at 20 ˚C
(blue — black/blue)

d. Connect the pocket tester (Ω × 1k) to the throttle position sensor.

Tester positive probe → yellow ③
Tester negative probe → black/blue ②

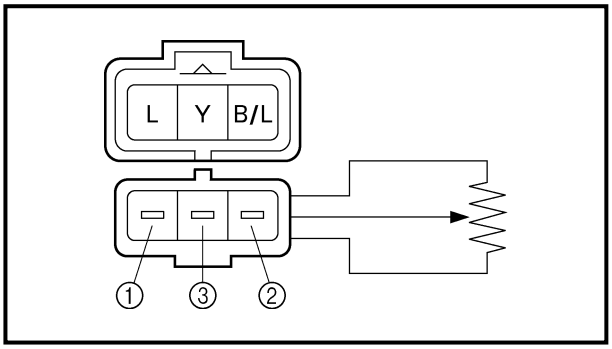
e. While slowly opening the throttle, check that the throttle position sensor resistance is within the specified range.

NOTE:
Check mainly that the resistance changes gradually when turning the throttle, since the readings (from closed to wide-open throttle) may differ slightly from those specified.

Out of specification or the resistance changes abruptly → Go to step (2).

Throttle position sensor resistance
0 ~ 5 ± 1.0 kΩ at 20 ˚C
(yellow — black/blue)

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2. Check:
 • throttle position sensor
 (removed from the carburetor)

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a. Disconnect the throttle position sensor coupler.

b. Remove the throttle position sensor from the carburetor.

c. Connect the pocket tester (Ω × 1k) to the throttle position sensor.

Tester positive probe → blue ①
Tester negative probe → black/blue ②

d. Measure the throttle position sensor maximum resistance.
 Out of specification → Replace the throttle position sensor.

Throttle position sensor maximum resistance
4.0 ~ 6.0 kΩ at 20 ˚C
(blue — black/blue)

e. Connect the pocket tester (Ω × 1k) to the throttle position sensor coupler.

Tester positive probe → yellow ③
Tester negative probe → black/blue ②

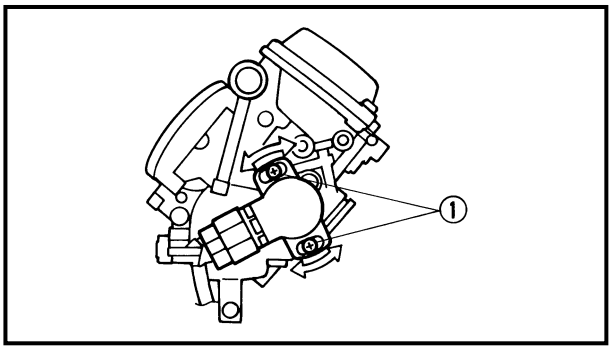
f. While slowly opening the throttle, check that the throttle position sensor resistance is within the specified range.

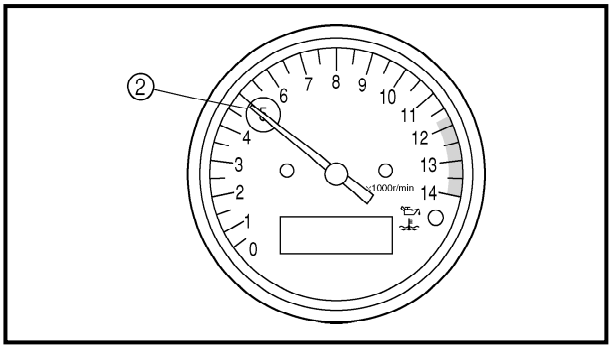
The resistance does not change or it changes abruptly → Replace the throttle position sensor.
The slot is worn or broken → Replace the throttle position sensor.

NOTE:
Check mainly that the resistance changes gradually when turning the throttle, since the readings (from closed to wide-open throttle) may differ slightly from those specified.

Throttle position sensor resistance
0 ~ 5 ± 1.0 kΩ at 20 ˚C
(yellow — black/blue)

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3. Adjust:
 • throttle position sensor angle

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a. Set the main switch to "ON".

b. Disconnect the throttle position sensor coupler.

c. Reconnect the throttle position sensor coupler.

NOTE:
After reconnecting the throttle position sensor coupler, the tachometer switches to the throttle position sensor adjustment mode.

d. Loosen the throttle position sensor screws ①.

e. Adjust the throttle position sensor angle according to the following table.

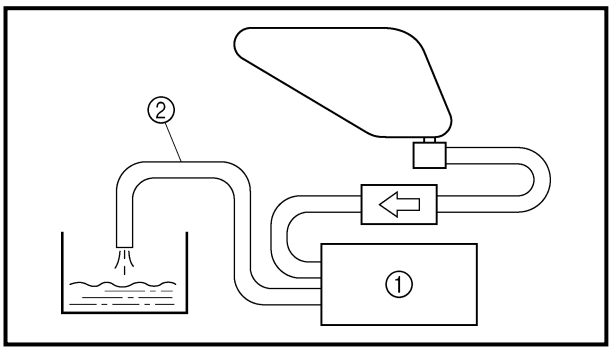
NOTE:
The angle of the throttle position sensor is indicated by the r/min which are displayed on the tachometer.

Tachometer reading	Throttle position sensor angle
0 r/min	**Too small**
5,000 r/min ②	**Correct**
10,000 r/min	**Too large**

f. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws.

NOTE:
To exit the throttle position sensor adjustment mode, start the engine or set the main switch to "OFF".

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EB600090
CHECKING THE FUEL PUMP

1. Check:
 • fuel pump ①

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a. Remove the fuel tank.
 Refer to "FUEL TANK" in chapter 3.

b. Disconnect the fuel-pump-to-carburetor fuel hose ② from the carburetor.

c. Connect the fuel-tank-to-fuel-pump fuel hose to the fuel tank and then set the fuel cock to "ON".

d. Place a container under the end of the fuel hose ②.

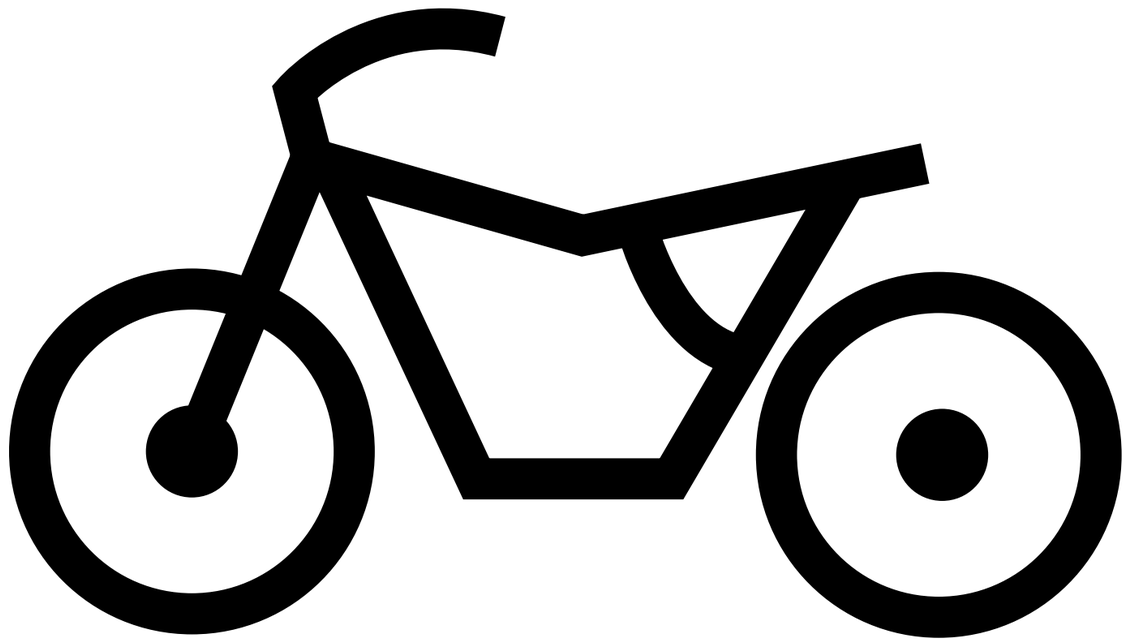
e. Start the engine and check if fuel flows from the fuel hose ②.

Fuel flows.	**Fuel pump is OK.**
Fuel does not flow.	**Replace the fuel pump.**

f. Stop the engine and check if the fuel stops flowing from the fuel hose ②.

Fuel stops flowing.	**Fuel pump is OK.**
Fuel flows.	**Replace the fuel pump.**

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CHAS 7

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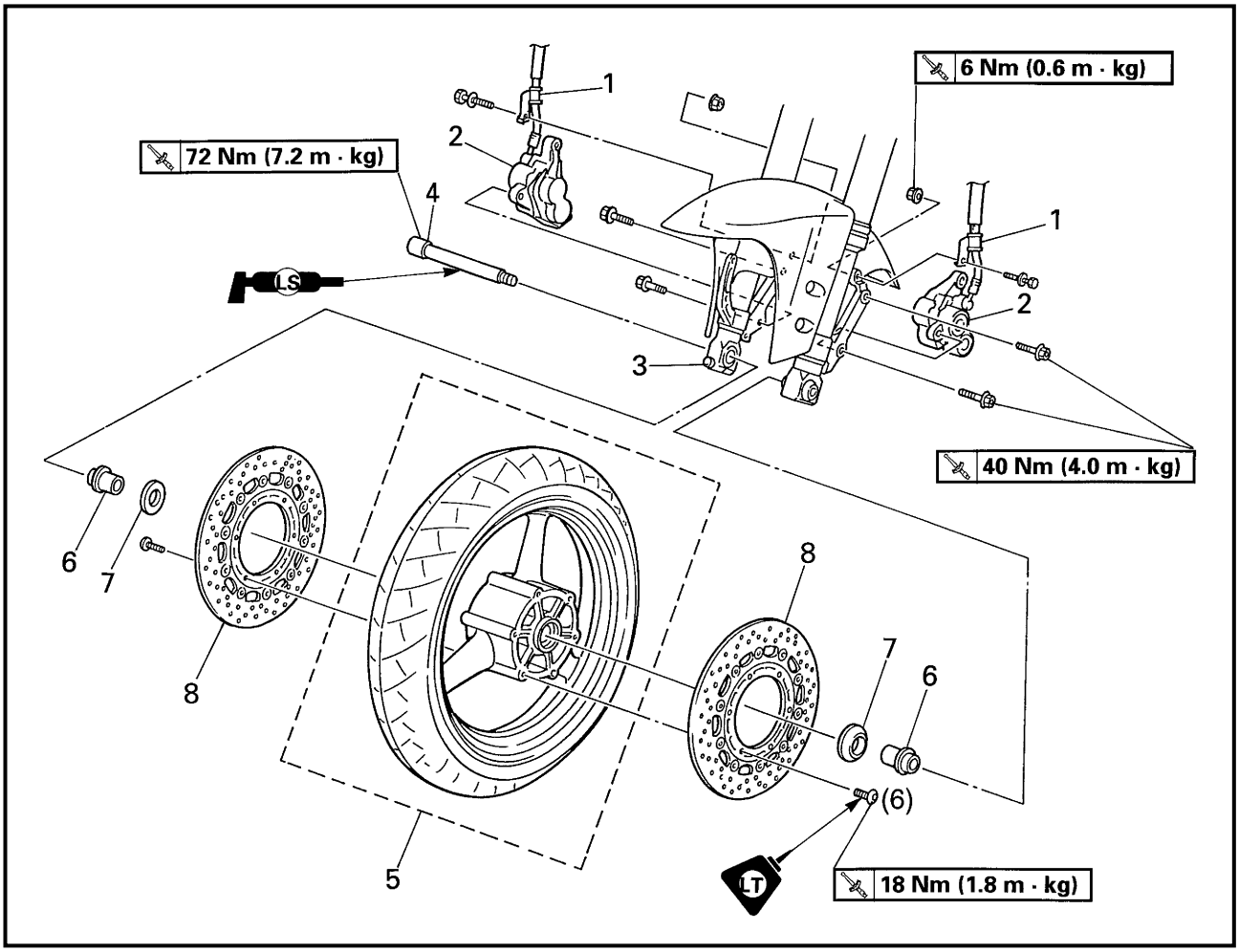
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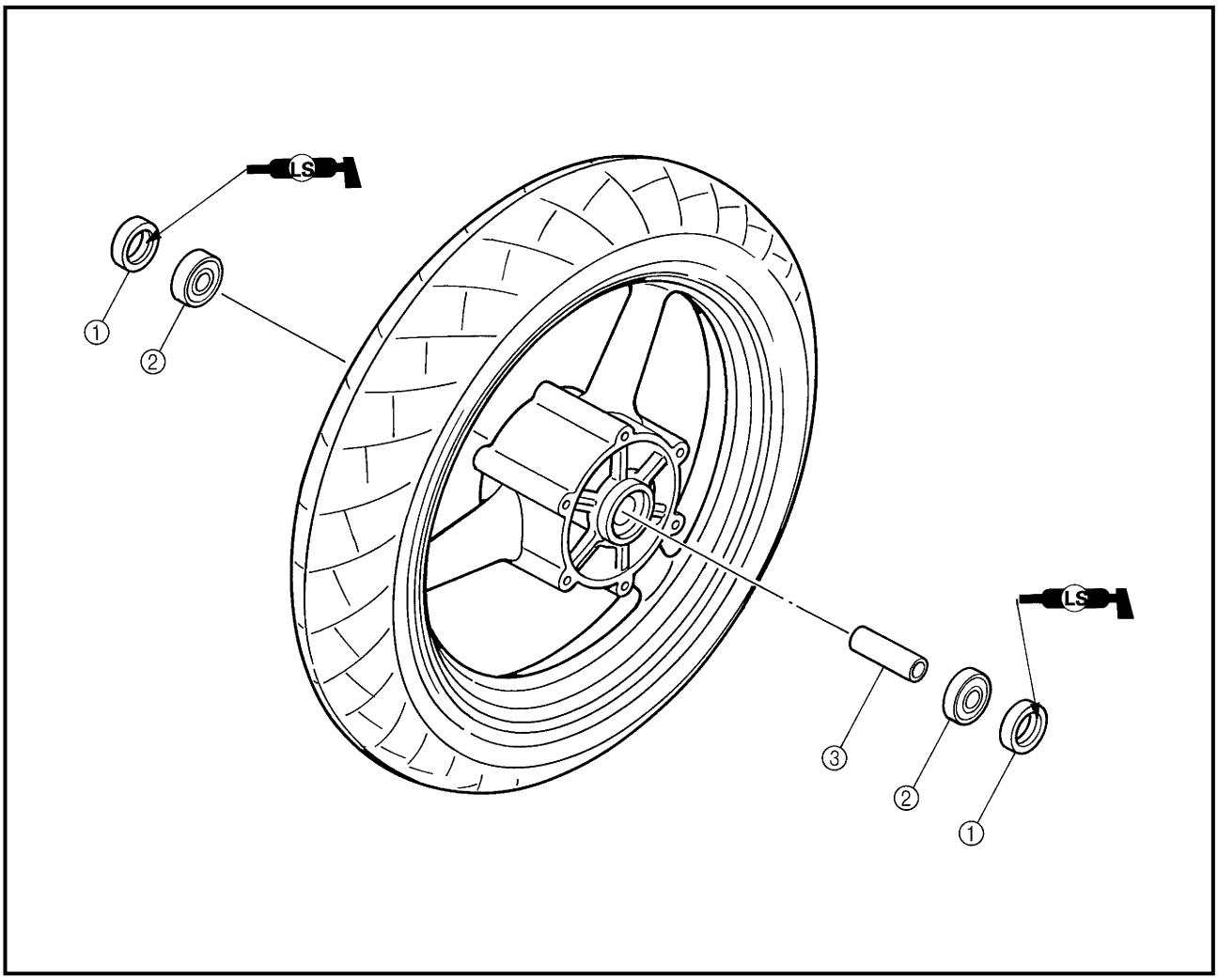
CHASSIS

FRONT WHEEL AND BRAKE DISCS



Order	Job/Part	Q'ty	Remarks
	Removing the front wheel and brake discs		Remove the parts in the order listed. **NOTE:** Place the motorcycle on a suitable stand so that the front wheel is elevated.
1	Brake hose holder (left and right)	2	
2	Brake caliper (left and right)	2	
3	Wheel axle pinch bolt	1	Loosen.
4	Front wheel axle	1	
5	Front wheel	1	
6	Collar (left and right)	2	
7	Oil seal cover (left and right)	2	
8	Brake disc (left and right)	2	
			For installation, reverse the removal procedure.

EB700010



Order	Job/Part	Q'ty	Remarks
	Disassembling the front wheel		Remove the parts in the order listed.
①	Oil seal (left and right)	2	
②	Wheel bearing (left and right)	2	
③	Spacer	1	
			For assembly, reverse the disassembly procedure.

EB700102
REMOVING THE FRONT WHEEL

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

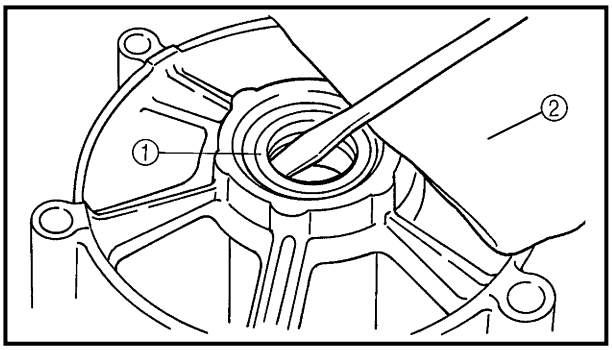
NOTE:
Place the motorcycle on a suitable stand so that the front wheel is elevated.

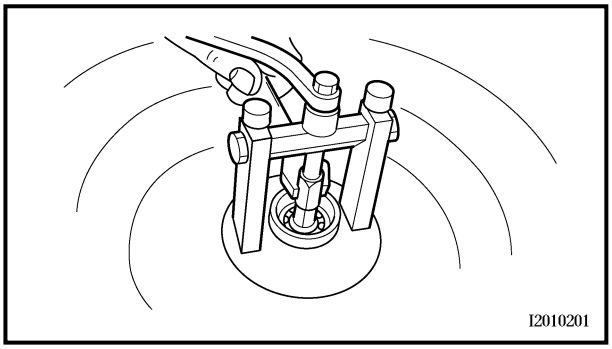
2. Remove:
 • left brake caliper
 • right brake caliper

NOTE:
Do not squeeze the brake lever when removing the brake calipers.

3. Elevate:
 • front wheel

NOTE:
Place the motorcycle on a suitable stand so that the front wheel is elevated.





EB700110
DISASSEMBLING THE FRONT WHEEL

1. Remove:
 • oil seals
 • wheel bearings

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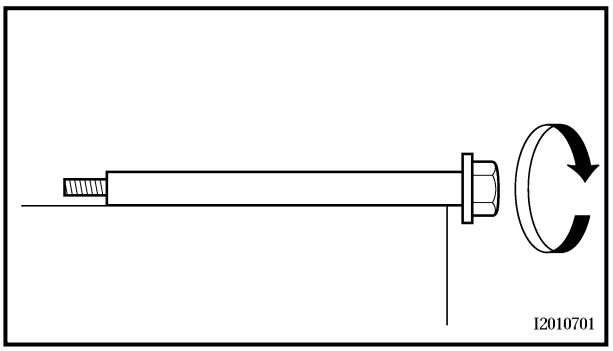
a. Clean the outside of the front wheel hub.

b. Remove the oil seals ① with a flat-head screwdriver.

NOTE:
To prevent damaging the wheel, place a rag ② between the screwdriver and the wheel surface.

c. Remove the wheel bearings with a general bearing puller.

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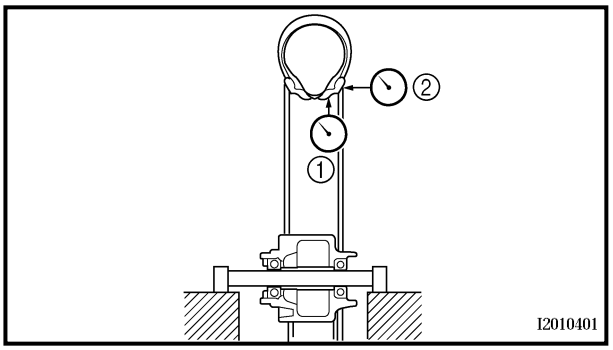
EB700400
CHECKING THE FRONT WHEEL

1. Check:
 • wheel axle
 Roll the wheel axle on a flat surface.
 Bends → Replace.

⚠ WARNING

Do not attempt to straighten a bent wheel axle.

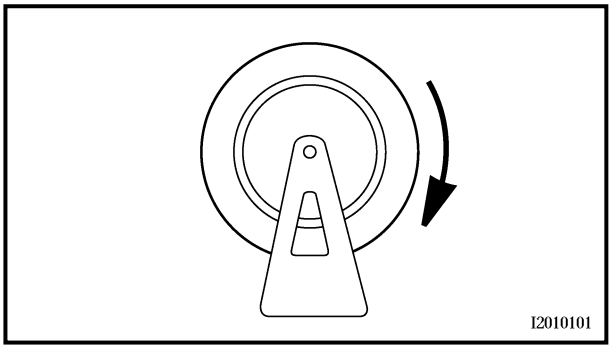
2. Check:
 • tire
 • front wheel
 Damage/wear → Replace.
 Refer to "CHECKING THE TIRES" and "CHECKING THE WHEELS" in chapter 3.



3. Measure:
 • radial wheel runout ①
 • lateral wheel runout ②
 Over the specified limits → Replace.

Max. radial wheel runout
1.0 mm
Max. lateral wheel runout
0.5 mm

4. Check:
 • wheel bearings
 Front wheel turns roughly or is loose → Replace the wheel bearings.
 • oil seals
 Damage/wear → Replace.

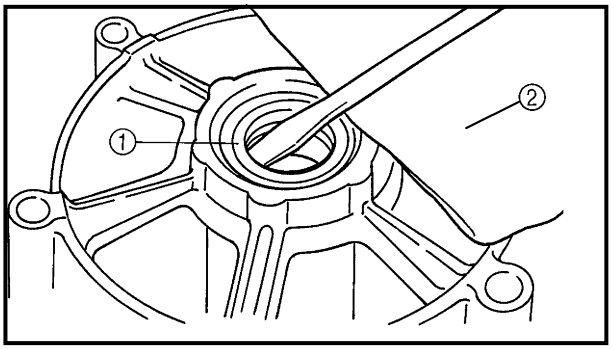


5. Replace:
 • wheel bearings New
 • oil seals New

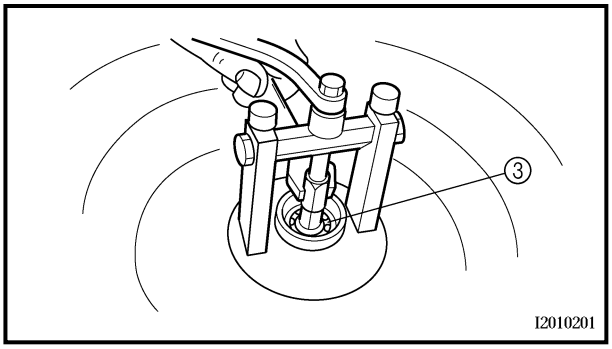
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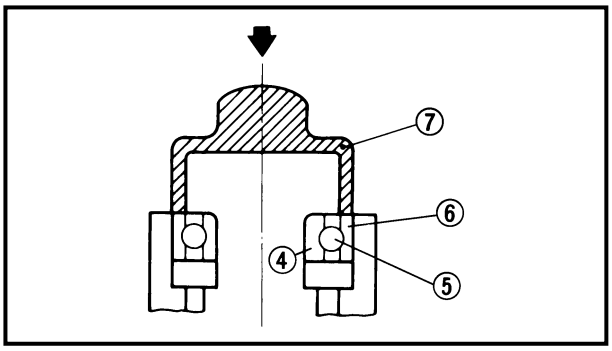
a. Clean the outside of the front wheel hub.

b. Remove the oil seals ① with a flat-head screwdriver.



NOTE:
To prevent damaging the wheel, place a rag ② between the screwdriver and the wheel surface.





c. Remove the wheel bearings ③ with a general bearing puller.

d. Install the new wheel bearings and oil seals in the reverse order of disassembly.

CAUTION:

Do not contact the wheel bearing center race ④ or balls ⑤. Contact should be made only with the outer race ⑥.

NOTE:

Use a socket ⑦ that matches the diameter of the wheel bearing outer race and oil seal.

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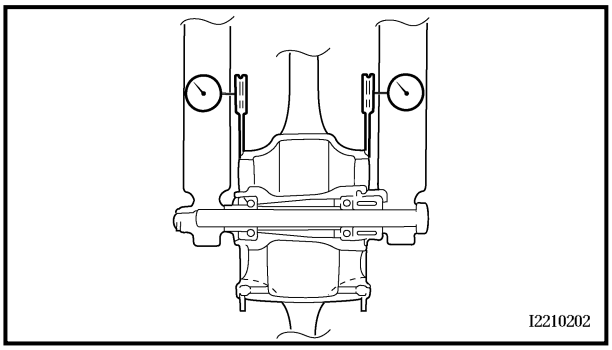
EB700416

CHECKING THE BRAKE DISCS

The following procedure applies to both of the brake discs.

1. Check:
 - brake disc
 Damage/galling → Replace.
2. Measure:
 - brake disc deflection
 Out of specification → Correct the brake disc deflection or replace the brake disc.

Max. brake disc deflection
Front: 0.1 mm
Rear: 0.1 mm



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a. Place the motorcycle on a suitable stand so that the wheel is elevated.

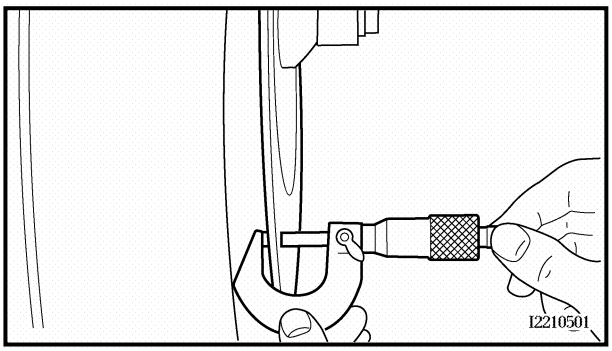
b. Before measuring the front brake disc deflection, turn the handlebars to the left or right to ensure that the front wheel is stationary.

c. Remove the brake caliper.

d. Hold the dial gauge at a right angle against the brake disc surface.

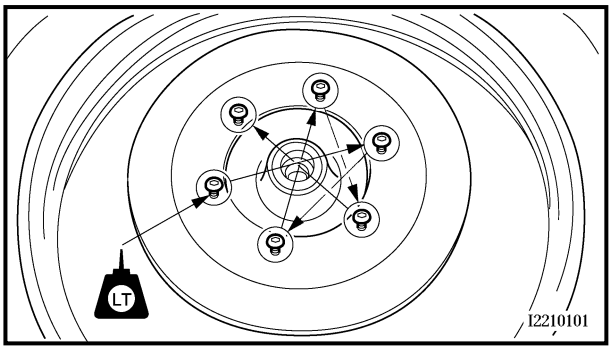
e. Measure the deflection 2 ~ 3 mm below the edge of the brake disc.

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3. Measure:
 • brake disc thickness
 Measure the brake disc thickness at a few different locations.
 Out of specification → Replace.

Min. brake disc thickness
Front: 4.5 mm
Rear: 4.5 mm



4. Adjust:
 • brake disc deflection

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a. Remove the brake disc.

b. Rotate the brake disc by one bolt hole.

c. Install the brake disc.

NOTE:
Tighten the brake disc bolts in stages and in a crisscross pattern.

Brake disc bolt
18 Nm (1.8 m • kg)
LOCTITE®

d. Measure the brake disc deflection.

e. If out of specification, repeat the adjustment steps until the brake disc deflection is within specification.

f. If the brake disc deflection cannot be brought within specification, replace the brake disc.

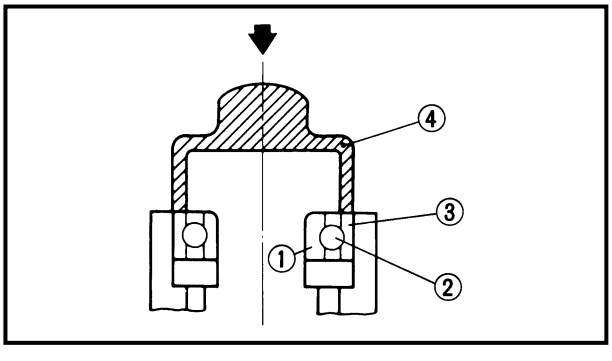
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EB700711
ASSEMBLING THE FRONT WHEEL

1. Install:
 • wheel bearings
 • oil seals New

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a. Install the new wheel bearings and oil seals in the reverse order of disassembly.



CAUTION:
Do not contact the wheel bearing center race ① or balls ②. Contact should be made only with the outer race ③.

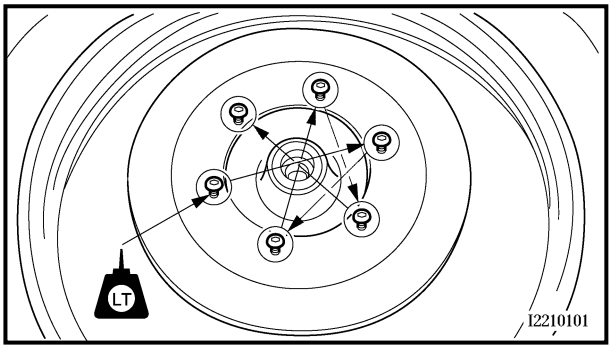
NOTE:
Use a socket ④ that matches the diameter of the wheel bearing outer race and oil seal.

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EB700725
INSTALLING THE FRONT WHEEL

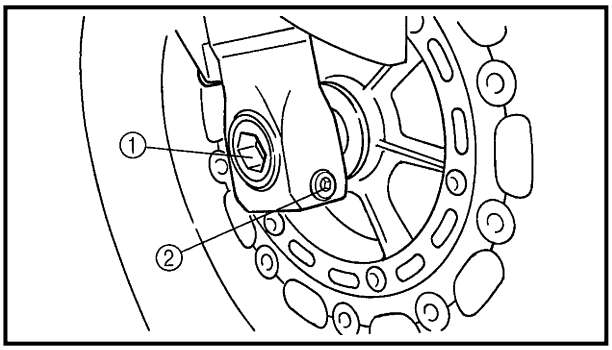
1. Lubricate:
 - wheel axle
 - oil seal lips

	Recommended lubricant **Lithium soap base grease**



2. Install:
 - brake discs — **18 Nm (1.8 m · kg)**

NOTE:
- Apply LOCTITE® 648 to the threads of the brake disc bolts.
- Tighten the brake disc bolts in stages and in a crisscross pattern.



3. Tighten:
 - wheel axle ① — **72 Nm (7.2 m · kg)**
 - wheel axle pinch bolt ② — **23 Nm (2.3 m · kg)**

CAUTION:

Before tightening the wheel axle nut, push down hard on the handlebars several times and check if the front fork rebounds smoothly.

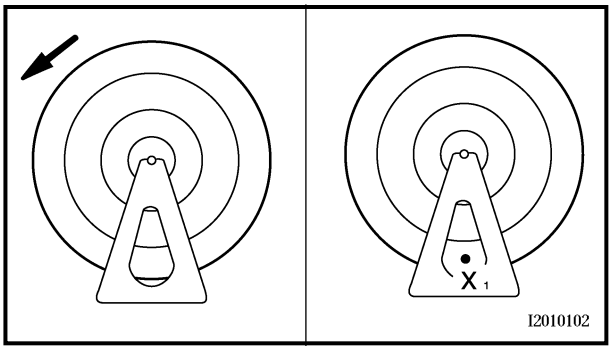
4. Install:
 - brake calipers — **40 Nm (4.0 m · kg)**

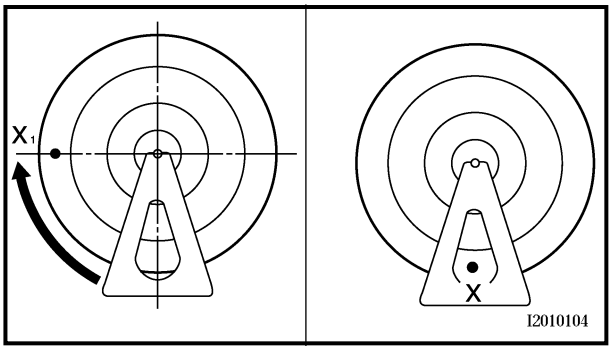
⚠ WARNING

Make sure that the brake hose is routed properly.

EB700901
ADJUSTING THE FRONT WHEEL STATIC BALANCE

NOTE:
- After replacing the tire, wheel or both, the front wheel static balance should be adjusted.
- Adjust the front wheel static balance with the brake discs installed.



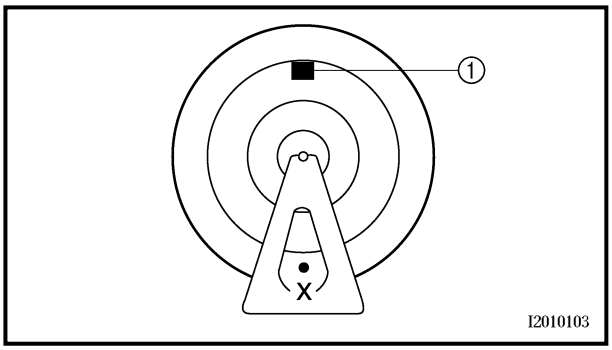


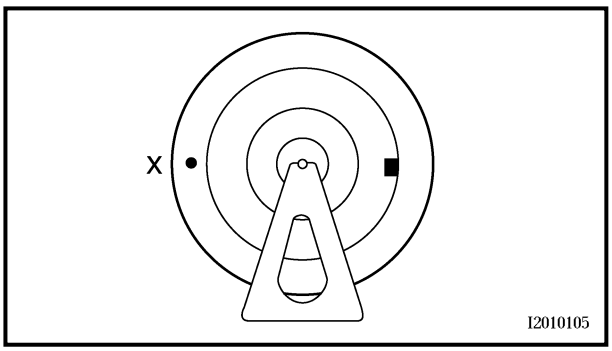
1. Remove:
 • balancing weight(-s)
2. Find:
 • front wheel's heavy spot

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a. Place the front wheel on a suitable balancing stand.
b. Spin the front wheel.
c. When the front wheel stops, put an "X_1" mark at the bottom of the wheel.
d. Turn the front wheel 90° so that the "X_1" mark is positioned as shown.
e. Release the front wheel.
f. When the front wheel stops, put an "X_2" mark at the bottom of the wheel.
g. Repeat steps (a) through (d) several times until all the marks come to rest at the same spot.
h. The spot where all the marks come to rest is the front wheel's heavy spot "X".

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3. Adjust:
 • front wheel static balance

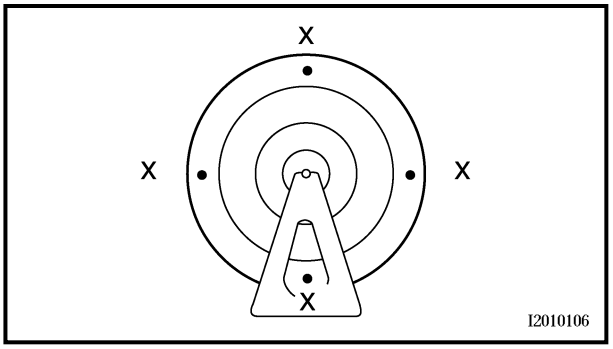
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a. Install a balancing weight ① onto the rim exactly opposite the heavy spot "X".

NOTE:
Start with the lightest weight.

b. Turn the front wheel 90° so that the heavy spot is positioned as shown.
c. If the heavy spot does not stay in that position, install a heavier weight.
d. Repeat steps (b) and (c) until the front wheel is balanced.

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4. Check:
 • front wheel static balance

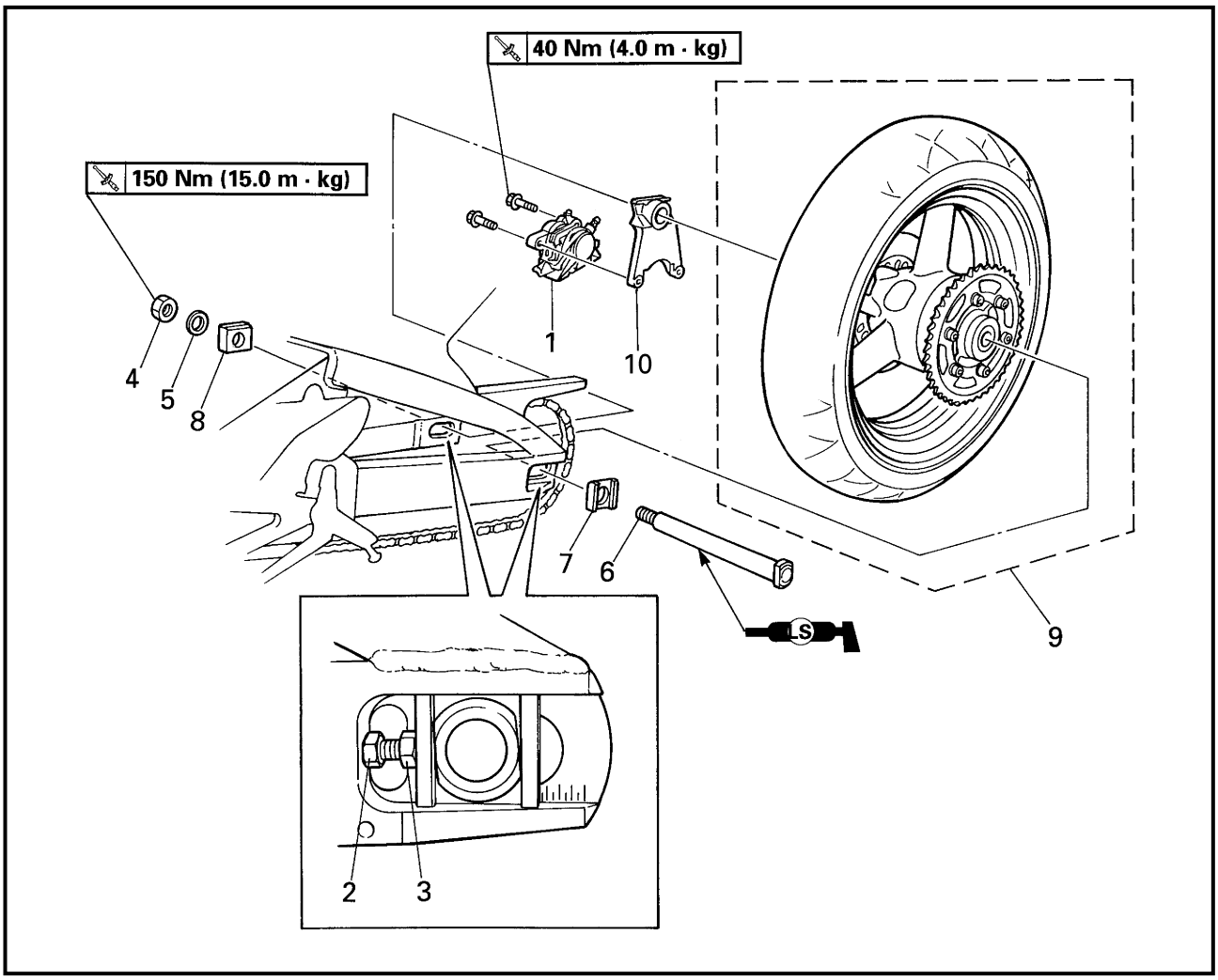
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a. Turn the front wheel and make sure that it stays at each position shown.

b. If the front wheel does not remain stationary at all of the positions, rebalance it.

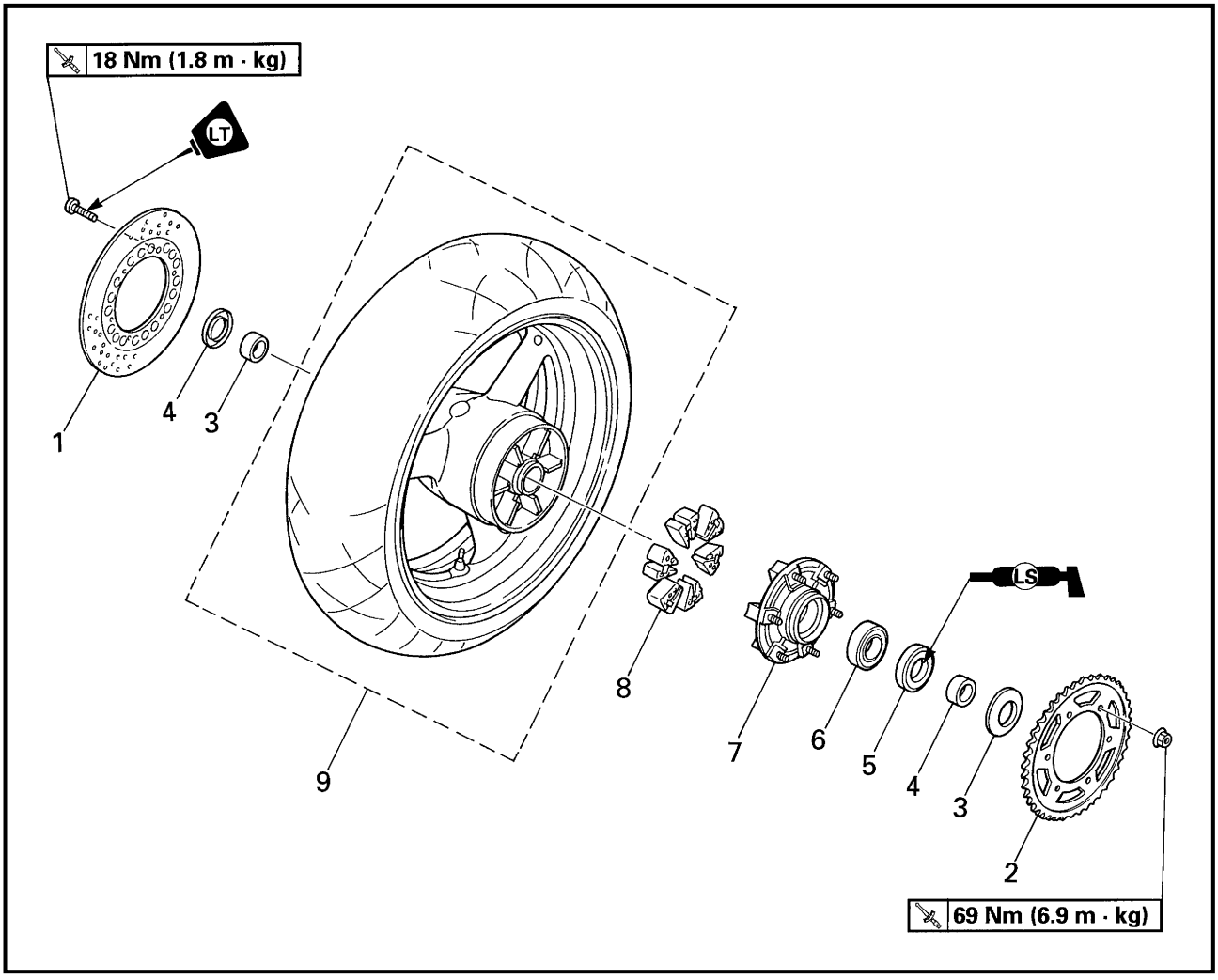
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EB701000
REAR WHEEL, BRAKE DISC, AND REAR WHEEL SPROCKET

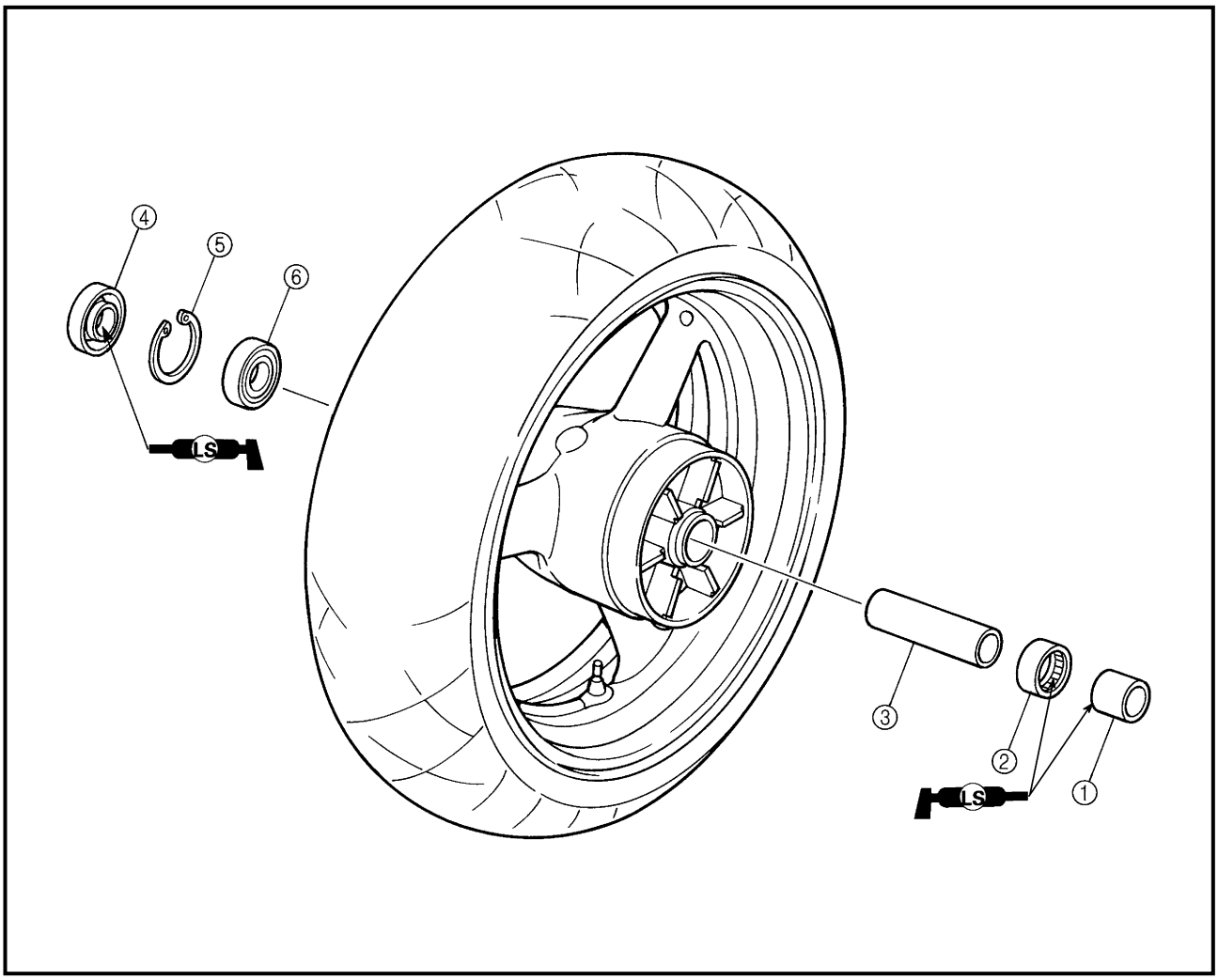


Order	Job/Part	Q'ty	Remarks
	Removing the rear wheel		Remove the parts in the order listed. **NOTE:** Place the motorcycle on a suitable stand so that the rear wheel is elevated.
1	Brake caliper	1	
2	Locknut (left and right)	2	Loosen.
3	Adjusting bolt (left and right)	2	Loosen.
4	Wheel axle nut	2	
5	Washer	1	
6	Rear wheel axle	1	
7	Left adjusting block	1	
8	Right adjusting block	1	**NOTE:** Make sure that the tapered side of the right adjusting block faces the wheel.
9	Rear wheel	1	
10	Brake caliper bracket	1	
			For installation, reverse the removal procedure.

EB701010



Order	Job/Part	Q'ty	Remarks
	Removing the brake disc and rear wheel sprocket		Remove the parts in the order listed.
1	Brake disc	1	
2	Rear wheel sprocket	1	
3	Oil seal cover (left and right)	2	
4	Spacer (left and right)	2	
5	Oil seal	1	
6	Bearing	1	
7	Rear wheel drive hub	1	
8	Rear wheel drive hub damper	6	
9	Rear wheel	1	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the rear wheel		Remove the parts in the order listed.
①	Spacer	1	
②	Bearing	1	
③	Spacer	1	
④	Oil seal	1	
⑤	Circlip	1	
⑥	Bearing	1	
			For assembly, reverse the disassembly procedure.

EB701100
REMOVING THE REAR WHEEL

1. Stand the motorcycle on a level surface.

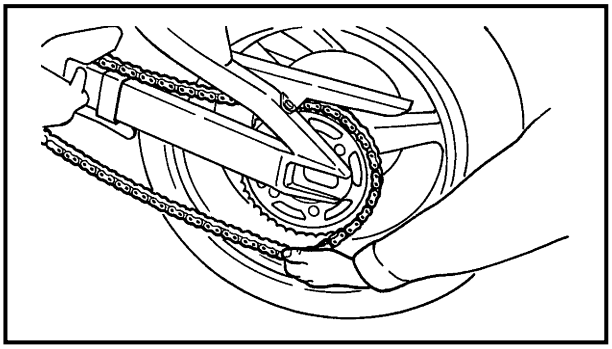
⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

NOTE:
Place the motorcycle on a suitable stand so that the rear wheel is elevated.

2. Remove:
 • brake caliper

NOTE:
Do not depress the brake pedal when removing the brake caliper.



3. Remove:
 • wheel axle nut
 • washer
 • wheel axle
 • adjusting blocks
 • rear wheel

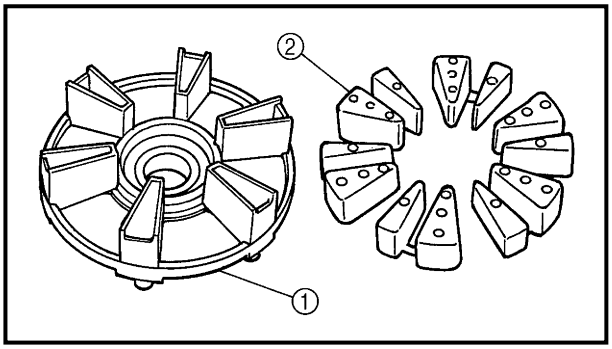
NOTE:
Push the rear wheel forward and remove the drive chain from the rear wheel sprocket.

EB701400
CHECKING THE REAR WHEEL

1. Check:
 • wheel axle
 • rear wheel
 • wheel bearings
 • oil seals
 • brake disc
 Refer to “FRONT WHEEL”.
2. Check:
 • tire
 • rear wheel
 Damage/wear → Replace.
 Refer to “CHECKING THE TIRES” and “CHECKING THE WHEELS” in chapter 3.

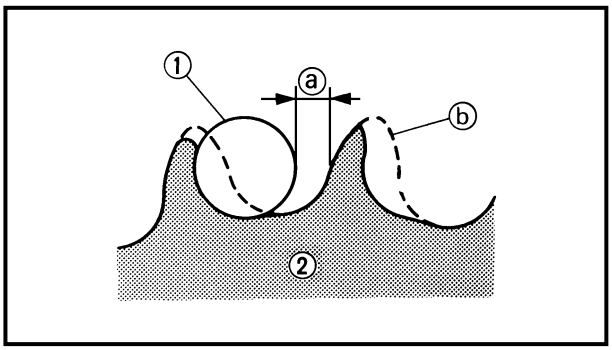
3. Measure:
 • radial wheel runout
 • lateral wheel runout
 Refer to "FRONT WHEEL".
 Over the specified limits → Replace.

Max. radial wheel runout
1.0 mm
Max. lateral wheel runout
0.5 mm



EB701430
CHECKING THE REAR WHEEL DRIVE HUB

1. Check:
 • rear wheel drive hub ①
 Cracks/damage → Replace.
 • rear wheel drive hub dampers ②
 Damage/wear → Replace.



EB701440
CHECKING AND REPLACING THE REAR WHEEL SPROCKET

1. Check:
 • rear wheel sprocket
 More than 1/4 tooth ⓐ wear → Replace the rear wheel sprocket.
 Bent teeth → Replace the rear wheel sprocket.
 ⓑ Correct
 ① Drive chain roller
 ② Rear wheel sprocket

2. Replace:
 • rear wheel sprocket

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a. Remove the self-locking nuts and the rear wheel sprocket.

b. Clean the rear wheel drive hub with a clean cloth, especially the surfaces that contact the sprocket.

c. Install the new rear wheel sprocket.

Rear wheel sprocket self-locking nut
150 Nm (15.0 m • kg)

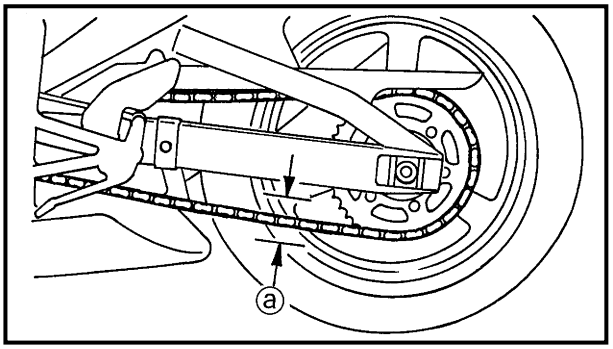
NOTE:
Tighten the self-locking nuts in stages and in a crisscross pattern.

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EB701710
INSTALLING THE REAR WHEEL

1. Lubricate:
 - wheel axle
 - wheel bearings
 - oil seal lips

	Recommended lubricant **Lithium soap base grease**



2. Adjust:
 - drive chain slack ⓐ

	Drive chain slack **40 ~ 50 mm**

Refer to "ADJUSTING THE DRIVE CHAIN SLACK" in chapter 3.

3. Tighten:
 - wheel axle nut **150 Nm (15.0 m · kg)**
 - brake caliper bolts **40 Nm (4.0 m · kg)**

⚠ WARNING

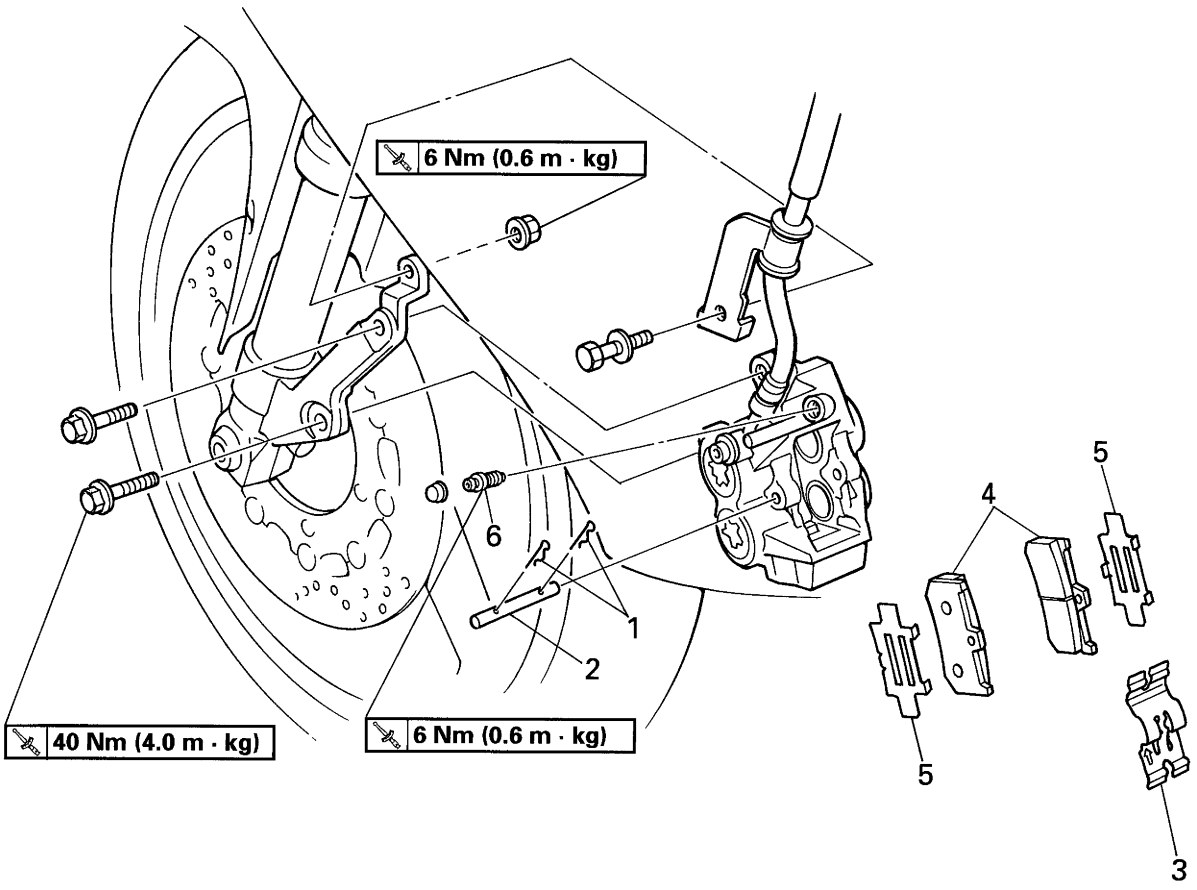
Make sure that the brake hose is routed properly.

EB701900
ADJUSTING THE REAR WHEEL STATIC BALANCE

NOTE:
- After replacing the tire, wheel or both, the rear wheel static balance should be adjusted.
- Adjust the rear wheel static balance with the brake disc and rear wheel drive hub installed.

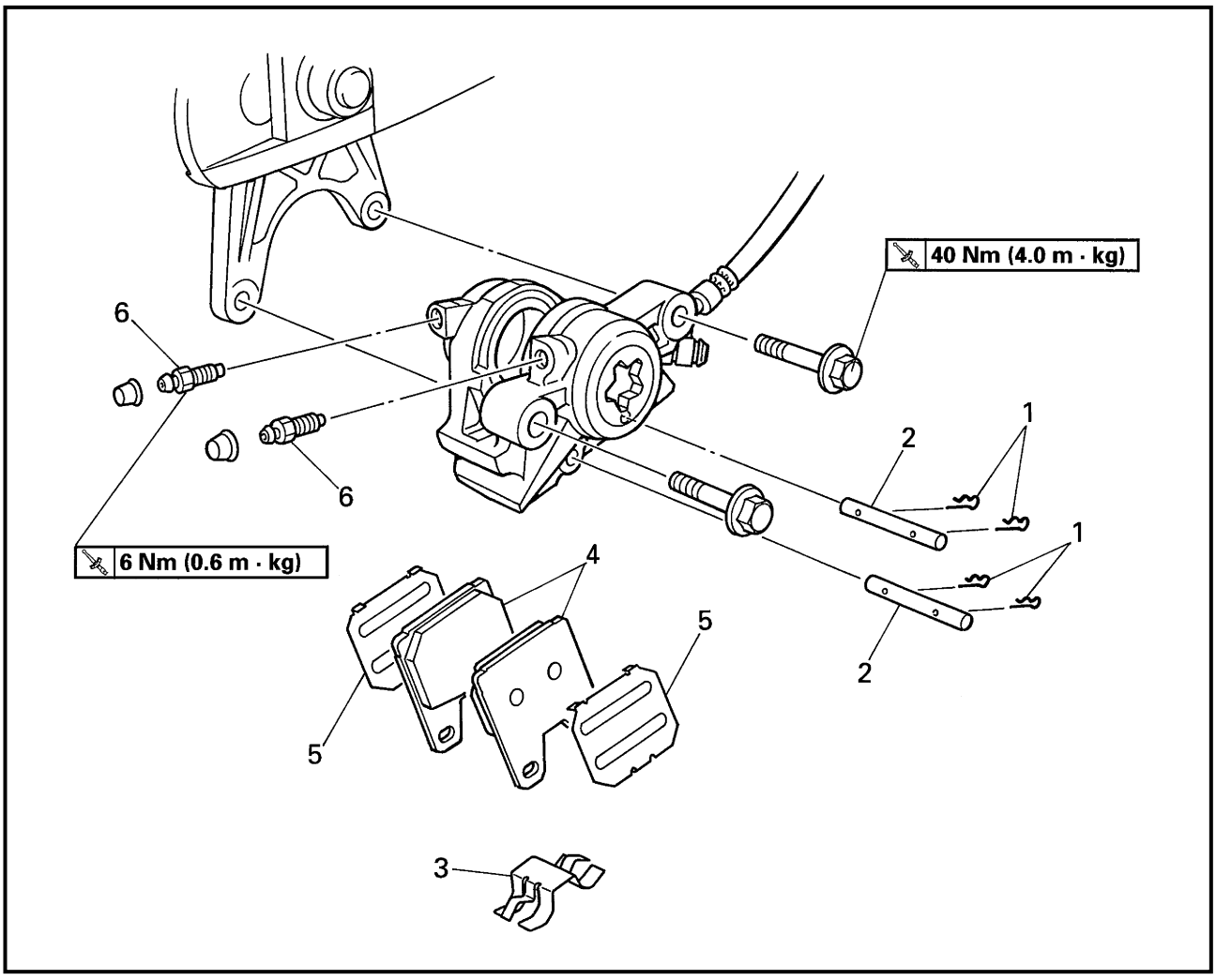
1. Adjust:
 - rear wheel static balance
 Refer to "FRONT WHEEL".

EB702001
FRONT AND REAR BRAKES



Order	Job/Part	Q'ty	Remarks
	Removing the front brake pads		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers.
1	Brake pad clip	2	
2	Brake pad pin	1	
3	Brake pad spring	1	
4	Brake pad	2	
5	Brake pad shim	2	
6	Bleed screw	1	
			For installation, reverse the removal procedure.

EB702002



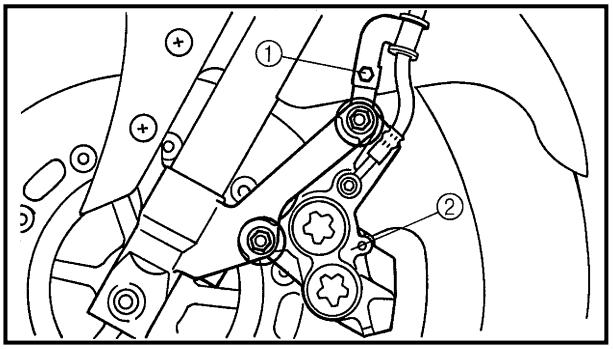
Order	Job/Part	Q'ty	Remarks
	Removing the rear brake pads		Remove the parts in the order listed.
1	Brake pad clip	4	
2	Brake pad pin	2	
3	Brake pad spring	1	
4	Brake pad	2	
5	Brake pad shim	2	
6	Bleed screw	2	
			For installation, reverse the removal procedure.

EB702100

CAUTION:

Disc brake components rarely require disassembly.
Therefore, always follow these preventive measures:
- **Never disassemble brake components unless absolutely necessary.**
- **If any connection on the hydraulic brake system is disconnected, the entire brake system must be disassembled, drained, cleaned, properly filled, and bled after reassembly.**
- **Never use solvents on internal brake components.**
- **Use only clean or new brake fluid for cleaning brake components.**
- **Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.**
- **Avoid brake fluid coming into contact with the eyes as it can cause serious injury.**

First aid for brake fluid entering the eyes:
- **Flush with water for 15 minutes and get immediate medical attention.**



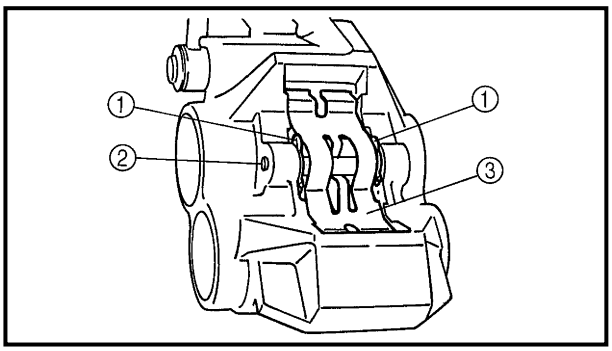
EB702112

REPLACING THE FRONT BRAKE PADS

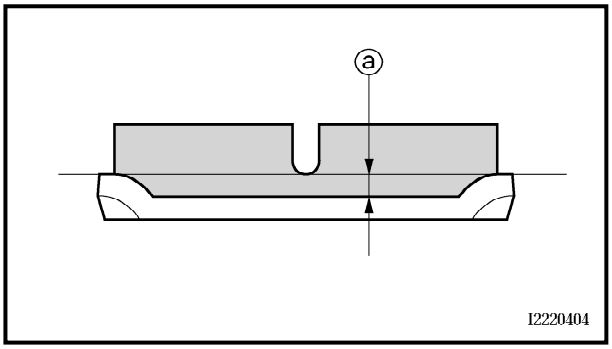
The following procedure applies to both brake calipers.

NOTE:
When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

1. Remove:
 - brake hose holder bolt ①
 - brake caliper ②



2. Remove:
 - brake pad clips ①
 - brake pad pin ②
 - brake pad spring ③
 - brake pads
 (along with the brake pad shims)



3. Measure:
 - brake pad wear limit ⓐ
 Out of specification → Replace the brake pads as a set.

	Brake pad wear limit **0.5 mm**

4. Install:
 - brake pad shims
 (onto the brake pads)
 - brake pads
 - brake pad spring

NOTE:
Always install new brake pads, brake pad shims, and a brake pad spring as a set.

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a. Connect a clear plastic hose ① tightly to the bleed screw ②. Put the other end of the hose into an open container.

b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.

c. Tighten the bleed screw.

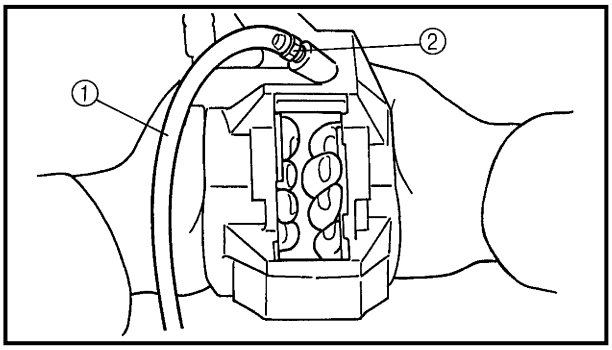
	Bleed screw **6 Nm (0.6 m • kg)**

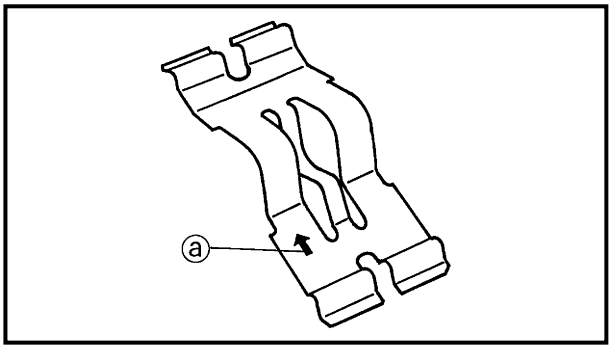
d. Install a new brake pad shim onto each new brake pads.

e. Install new brake pads and a new brake pad spring.

NOTE:
The arrow ⓐ on the brake pad spring must point in the direction of disc rotation.

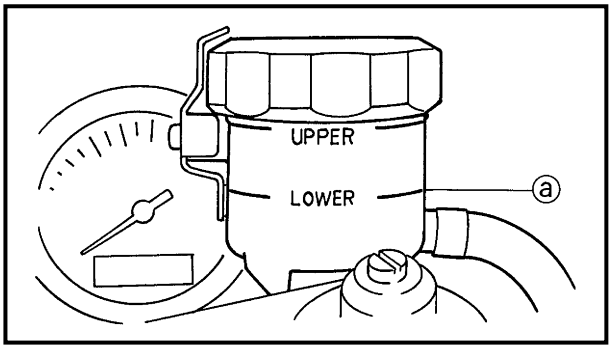
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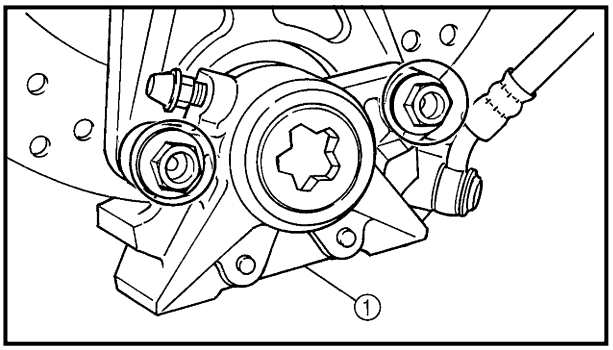
5. Install:
 - brake pad pin
 - brake pad clips
 - brake caliper

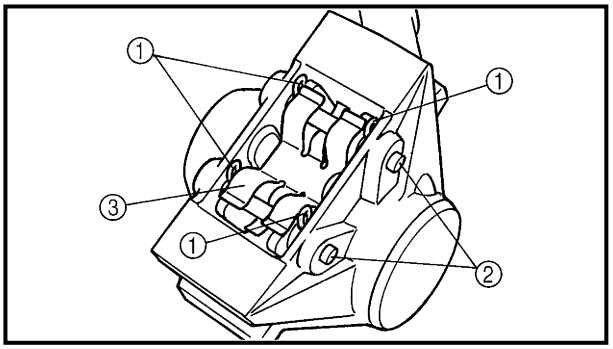
40 Nm (4.0 m · kg)



6. Check:
 - brake fluid level
 Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
 Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

7. Check:
 - brake lever operation
 Soft or spongy feeling → Bleed the brake system.
 Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.



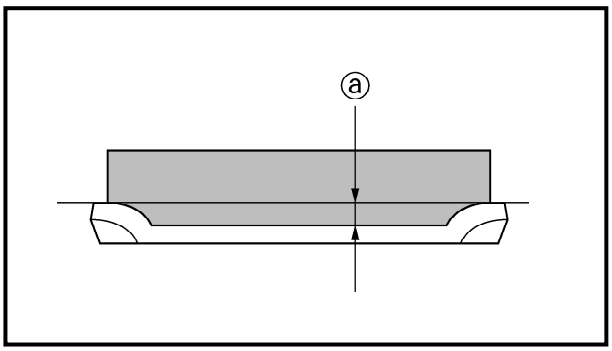


EB702113
REPLACING THE REAR BRAKE PADS

NOTE:
When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

1. Remove:
 - brake caliper ①
 - brake pad cover

2. Remove:
 - brake pad clips ①
 - brake pad pins ②
 - brake pad spring ③
 - brake pads
 (along with the brake pad shims)



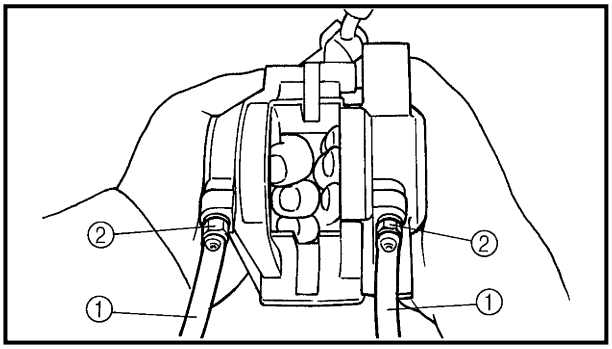
3. Measure:
 • brake pad wear limit ⓐ
 Out of specification → Replace the brake pads as a set.

Brake pad wear limit
0.5 mm

4. Install:
 • brake pad shims
 (onto the brake pads)
 • brake pads
 • brake pad spring

NOTE:
Always install new brake pads, brake pad shims, and a brake pad spring as a set.

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a. Connect a clear plastic hose ① tightly to the bleed screw ②. Put the other end of the hose into an open container.

b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.

c. Tighten the bleed screw.

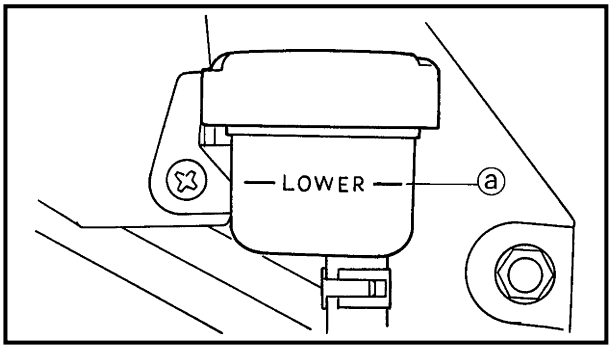
Bleed screw
6 Nm (0.6 m • kg)

d. Install a new brake pad shim onto each new brake pad.

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5. Install:
 - brake pad pins
 - brake pad clips
 - brake pad cover
 - brake caliper

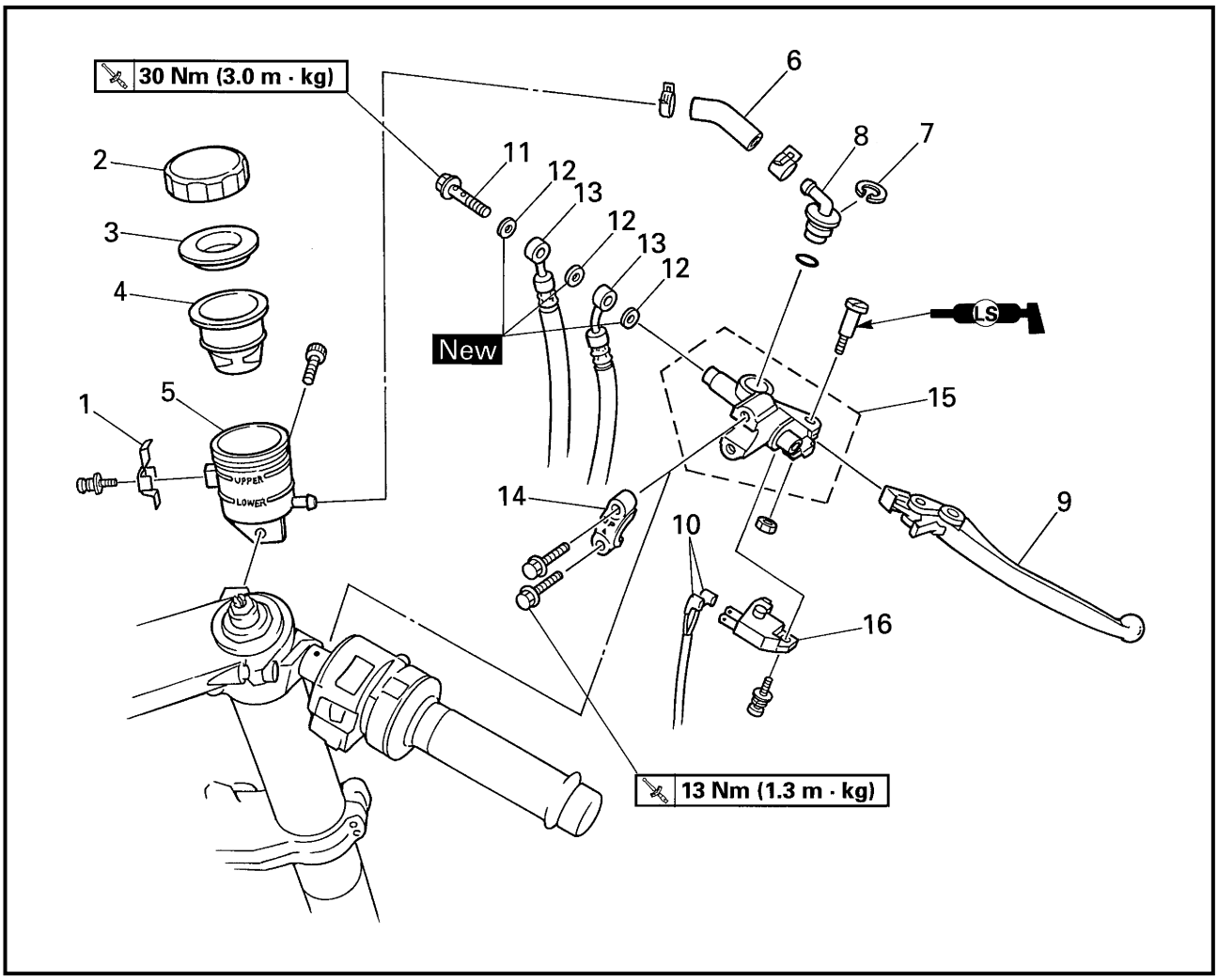
40 Nm (4.0 m · kg)



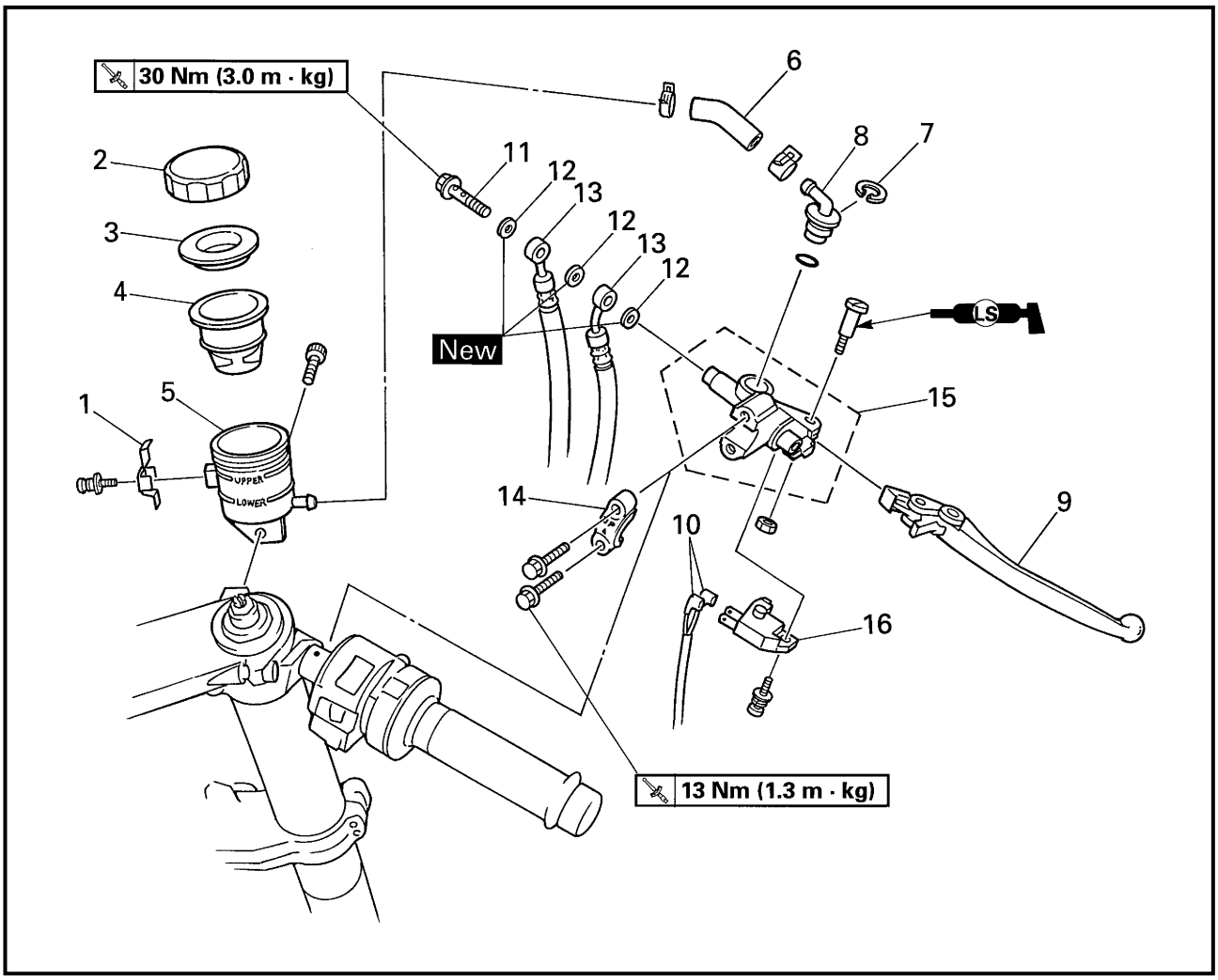
6. Check:
 - brake fluid level
 Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
 Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

7. Check:
 - brake pedal operation
 Soft or spongy feeling → Bleed the brake system.
 Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

EB702200

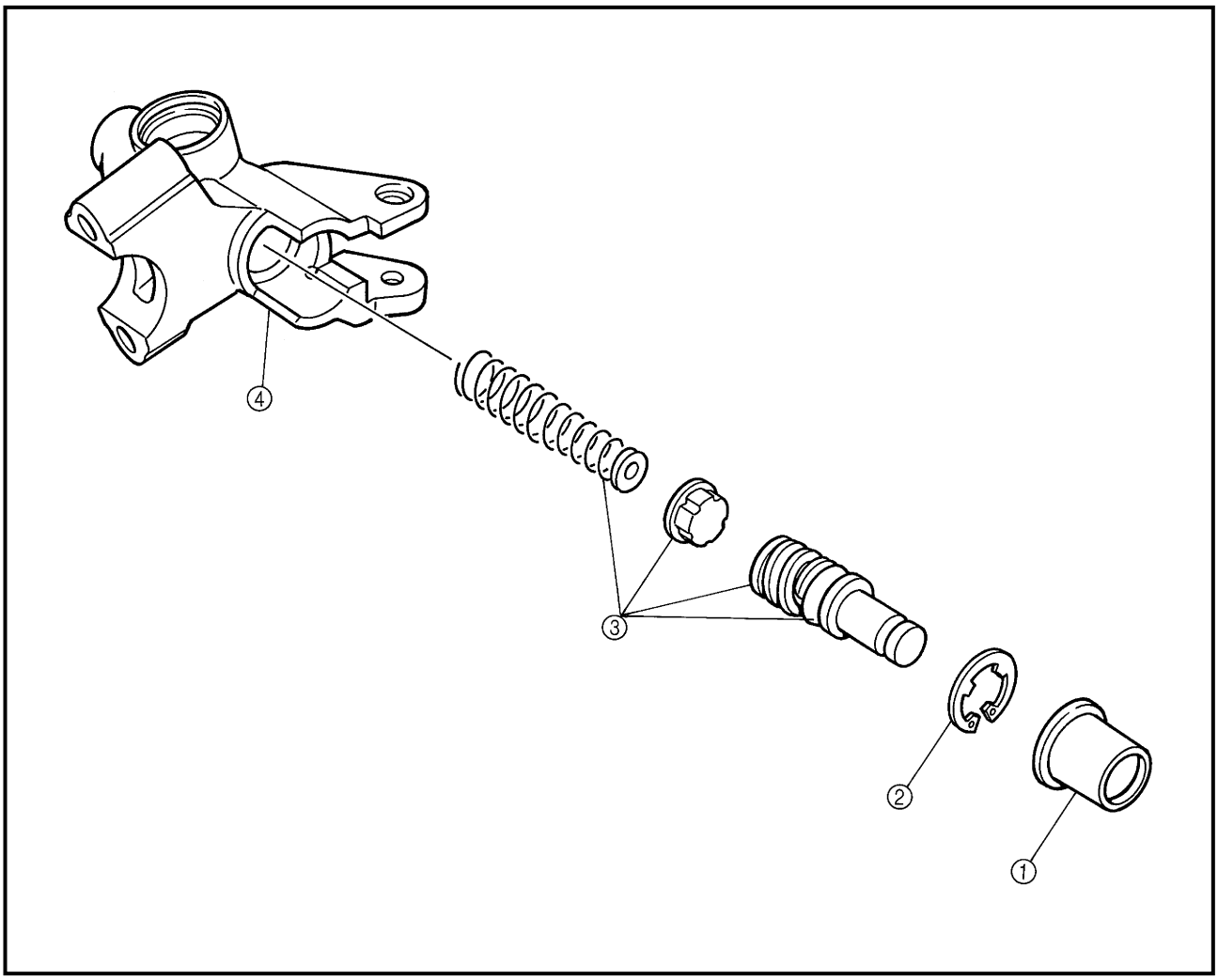


Order	Job/Part	Q'ty	Remarks
	Removing the front brake master cylinder and brake fluid reservoir		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Brake fluid reservoir cap stopper	1	
2	Brake fluid reservoir cap	1	
3	Brake fluid reservoir diaphragm holder	1	
4	Brake fluid reservoir diaphragm	1	
5	Brake fluid reservoir	1	
6	Brake fluid reservoir hose	1	
7	Circlip	1	
8	Hose joint	1	
9	Brake lever	1	
10	Front brake switch connector	2	Disconnect.
11	Union bolt	1	
12	Copper washer	3	



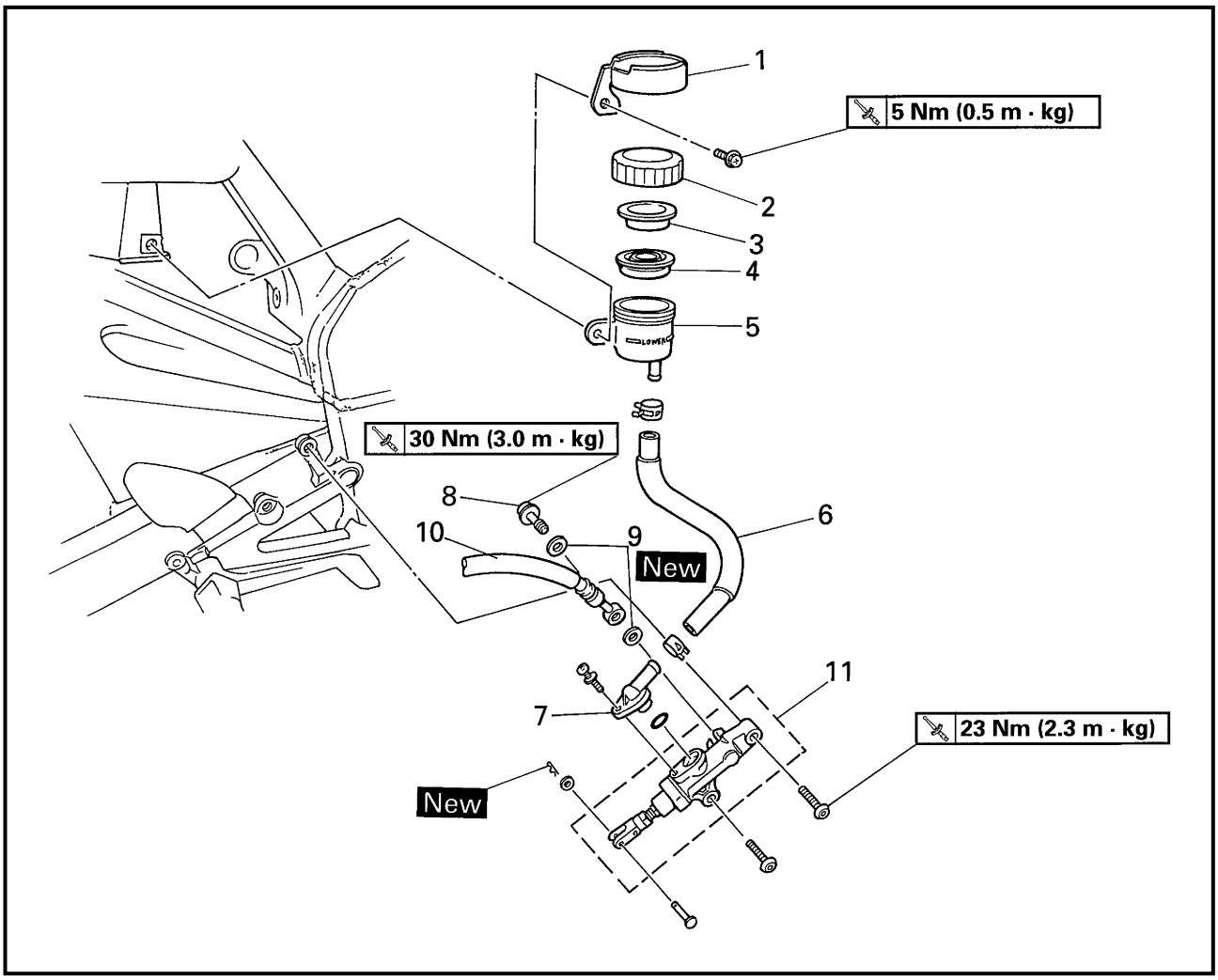
Order	Job/Part	Q'ty	Remarks
13	Brake hose	2	
14	Brake master cylinder holder	1	
15	Brake master cylinder	1	
16	Front brake switch	1	
			For installation, reverse the removal procedure.

EB702201



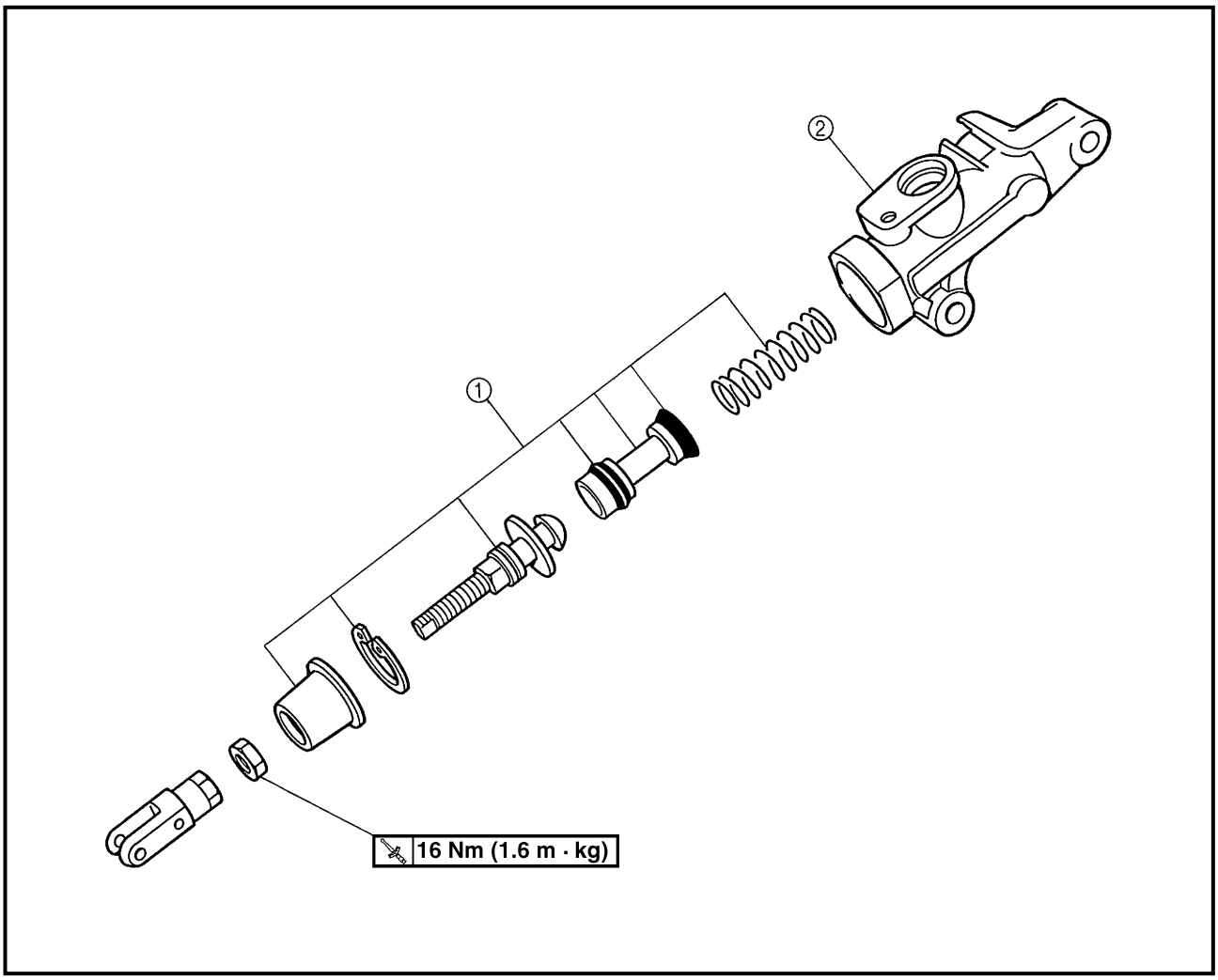
Order	Job/Part	Q'ty	Remarks
	Disassembling the front brake master cylinder		Remove the parts in the order listed.
①	Dust boot	1	
②	Circlip	1	
③	Brake master cylinder kit	1	
④	Brake master cylinder	1	
			For assembly, reverse the disassembly procedure.

EB702202

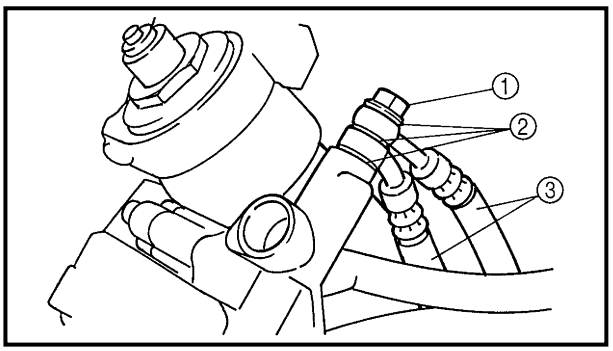


Order	Job/Part	Q'ty	Remarks
	Removing the rear brake master cylinder and brake fluid reservoir		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Brake fluid reservoir cap stopper	1	
2	Brake fluid reservoir cap	1	
3	Brake fluid reservoir diaphragm holder	1	
4	Brake fluid reservoir diaphragm	1	
5	Brake fluid reservoir	1	
6	Brake fluid reservoir hose	1	
7	Hose joint	1	
8	Union bolt	1	
9	Copper washer	2	
10	Brake hose	1	
11	Brake master cylinder	1	
			For installation, reverse the removal procedure.

EB702203



Order	Job/Part	Q'ty	Remarks
	Disassembling the rear brake master cylinder		Remove the parts in the order listed.
①	Brake master cylinder kit	1	
②	Brake master cylinder	1	
			For assembly, reverse the disassembly procedure.

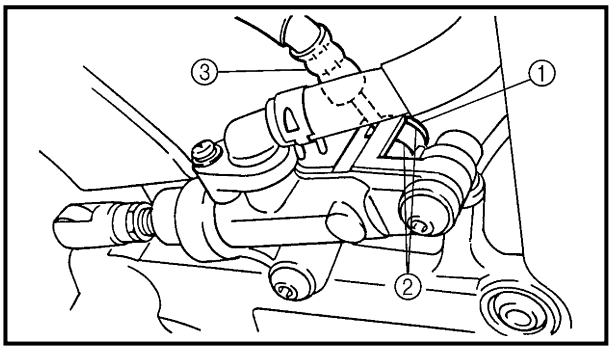


EB702210
DISASSEMBLING THE FRONT BRAKE MASTER CYLINDER

NOTE:
Before disassembling the front brake master cylinder, drain the brake fluid from the entire brake system.

1. Remove:
 - union bolt ①
 - copper washers ②
 - brake hoses ③

NOTE:
To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

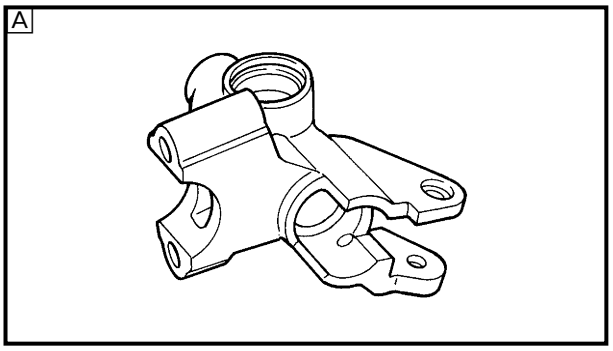


EB702220
DISASSEMBLING THE REAR BRAKE MASTER CYLINDER

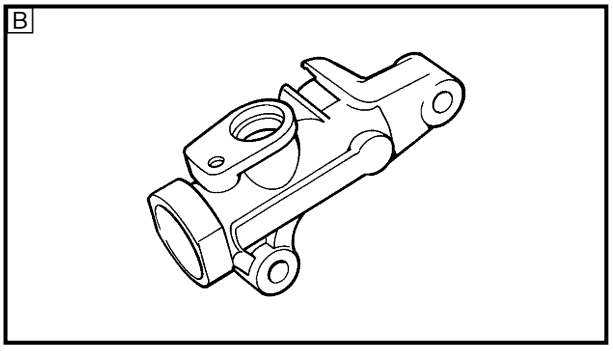
1. Remove:
 - union bolt ①
 - copper washers ②
 - brake hose ③

NOTE:
To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

A



B

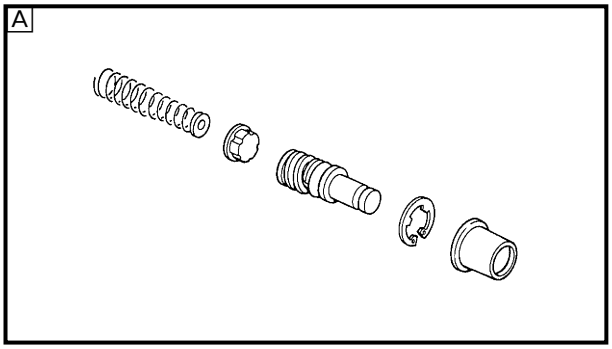


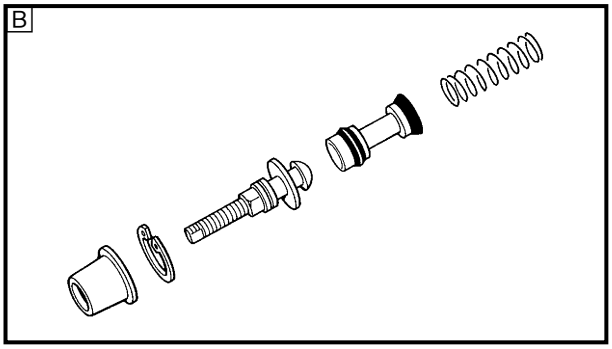
EB702243
CHECKING THE FRONT AND REAR BRAKE MASTER CYLINDERS

The following procedure applies to both of the brake master cylinders.

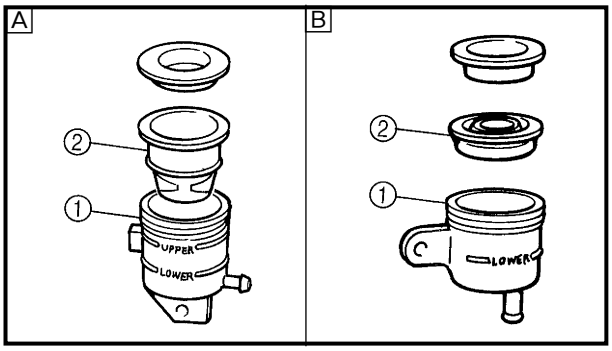
1. Check:
 - brake master cylinder
 Damage/scratches/wear → Replace.
 - brake fluid delivery passages
 (brake master cylinder body)
 Obstruction → Blow out with compressed air.

 A Front
 B Rear





2. Check:
 - brake master cylinder kit
 Damage/scratches/wear → Replace.
 A Front
 B Rear



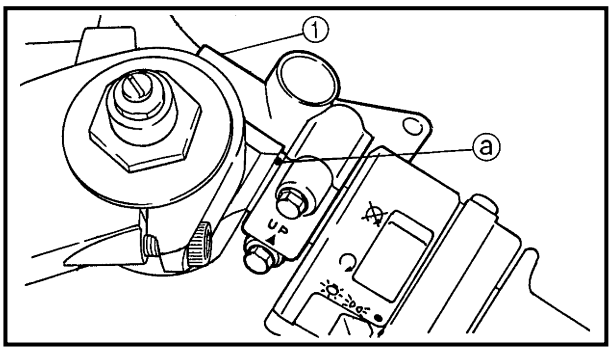
3. Check:
 - brake fluid reservoir ①
 Cracks/damage → Replace.
 - brake fluid reservoir diaphragm ②
 Cracks/damage → Replace.
4. Check:
 - brake hoses
 Cracks/damage/wear → Replace.

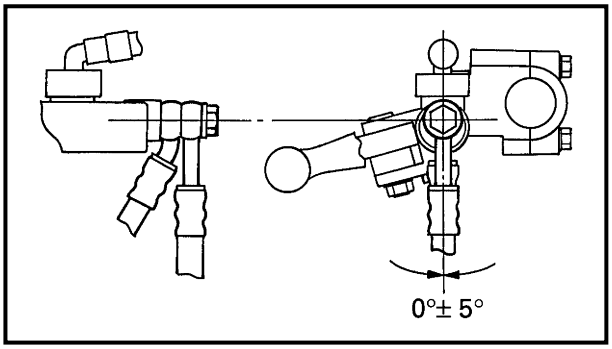
EB702283
ASSEMBLING AND INSTALLING THE FRONT BRAKE MASTER CYLINDER

⚠ WARNING

- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components.**

Recommended brake fluid
DOT 4





1. Install:
 • brake master cylinder ①

 13 Nm (1.3 m · kg)

NOTE:
- Install the brake master cylinder holder with the "UP" mark facing up.
- Align the end of the brake master cylinder holder with the punch mark ⓐ in the right handlebar.
- First, tighten the upper bolt, then the lower bolt.

2. Install:
 • copper washers New
 • brake hose
 • union bolt **30 Nm (3.0 m · kg)**

⚠ WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

NOTE:
- While holding the brake hose, tighten the union bolt as shown.
- Turn the handlebars to the left and to the right to make sure that the brake hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.

3. Fill:
 • brake fluid reservoir
 (with the specified amount of the recommended brake fluid)

Recommended brake fluid
DOT 4

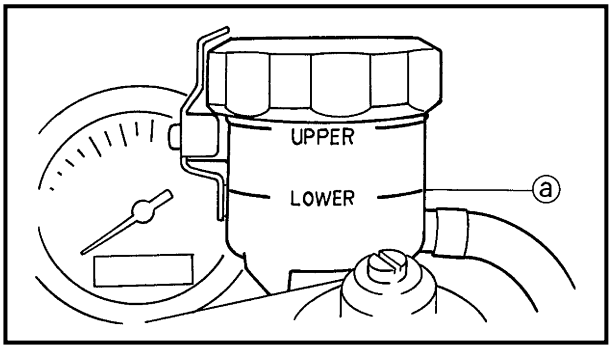
⚠ WARNING

- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

CAUTION:

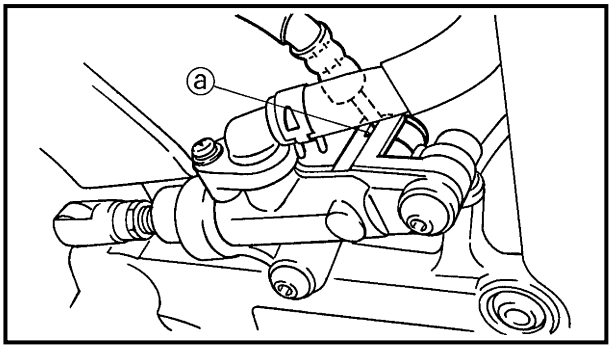
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

4. Bleed:
 • brake system
 Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.



5. Check:
 • brake fluid level
 Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
 Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

6. Check:
 • brake lever operation
 Soft or spongy feeling → Bleed the brake system.
 Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.



EB702290

ASSEMBLING THE REAR BRAKE MASTER CYLINDER

1. Install:
 • copper washers New
 • brake hoses
 • union bolt 30 Nm (3.0 m · kg)

⚠ WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

CAUTION:

When installing the brake hose onto the brake master cylinder, make sure that the brake pipe touches the projection ⓐ as shown.

2. Fill:
 • brake fluid reservoir

	Recommended brake fluid **DOT 4**

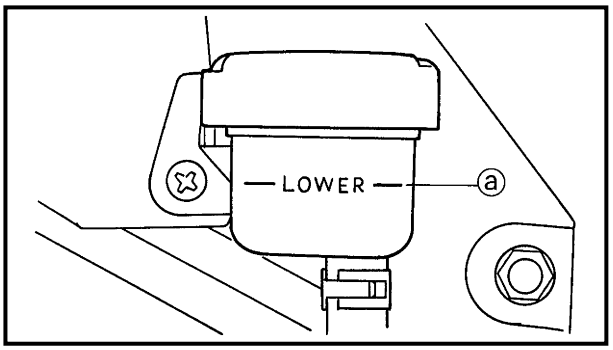
⚠ WARNING

- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

CAUTION:

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

3. Bleed:
 • brake system
 Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

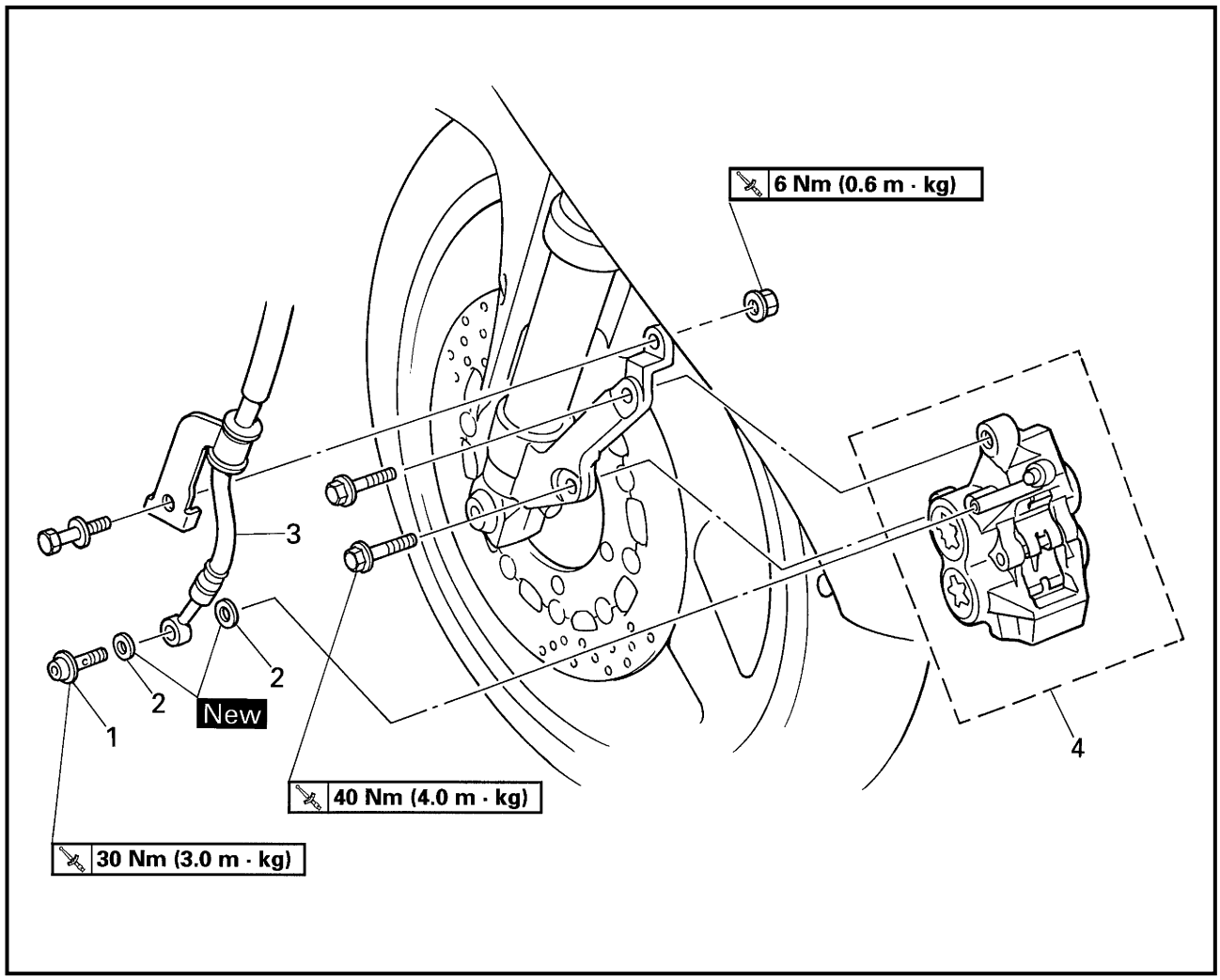


4. Check:
 • brake fluid level
 Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
 Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.
5. Adjust:
 • brake pedal position
 Refer to "ADJUSTING THE REAR BRAKE" in chapter 3.

	Brake pedal position (from the top of the brake pedal to the bottom of the rider footrest bracket) **35 ~ 40 mm**

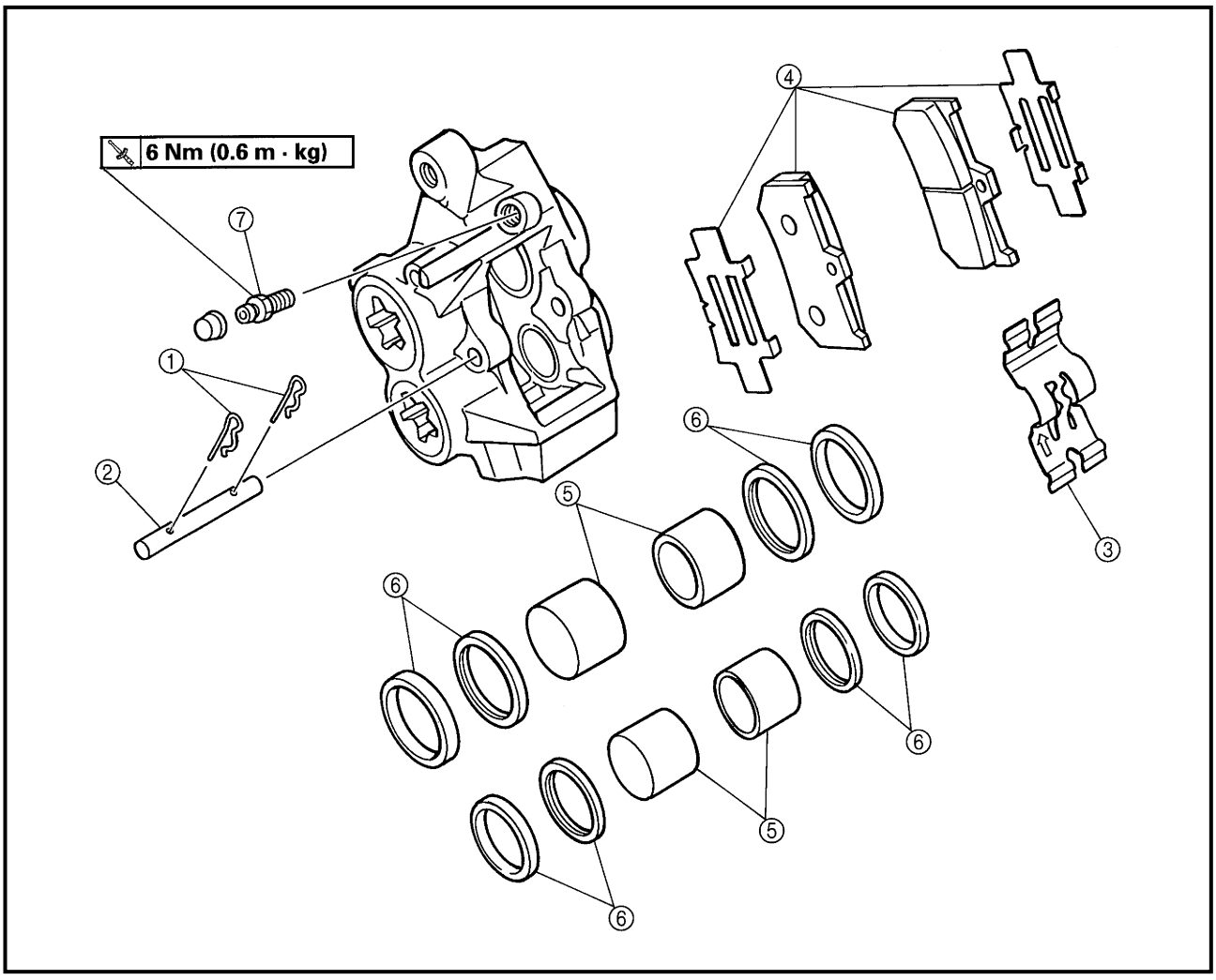
6. Adjust:
 • rear brake light operation timing
 Refer to "ADJUSTING THE REAR BRAKE LIGHT SWITCH" in chapter 3.

EB702301



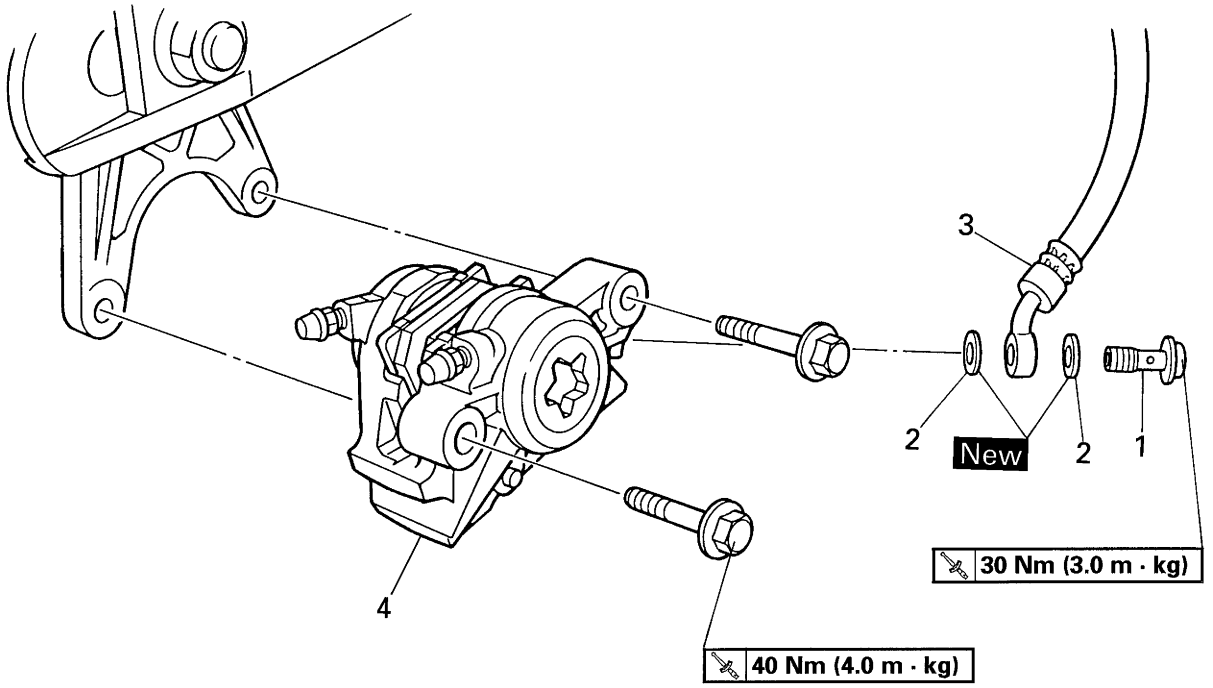
Order	Job/Part	Q'ty	Remarks
	Removing the front brake calipers		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers.
	Brake fluid		Drain.
1	Union bolt	1	
2	Copper washer	2	
3	Brake hose	1	
4	Brake caliper	1	
			For installation, reverse the removal procedure.

EB702303



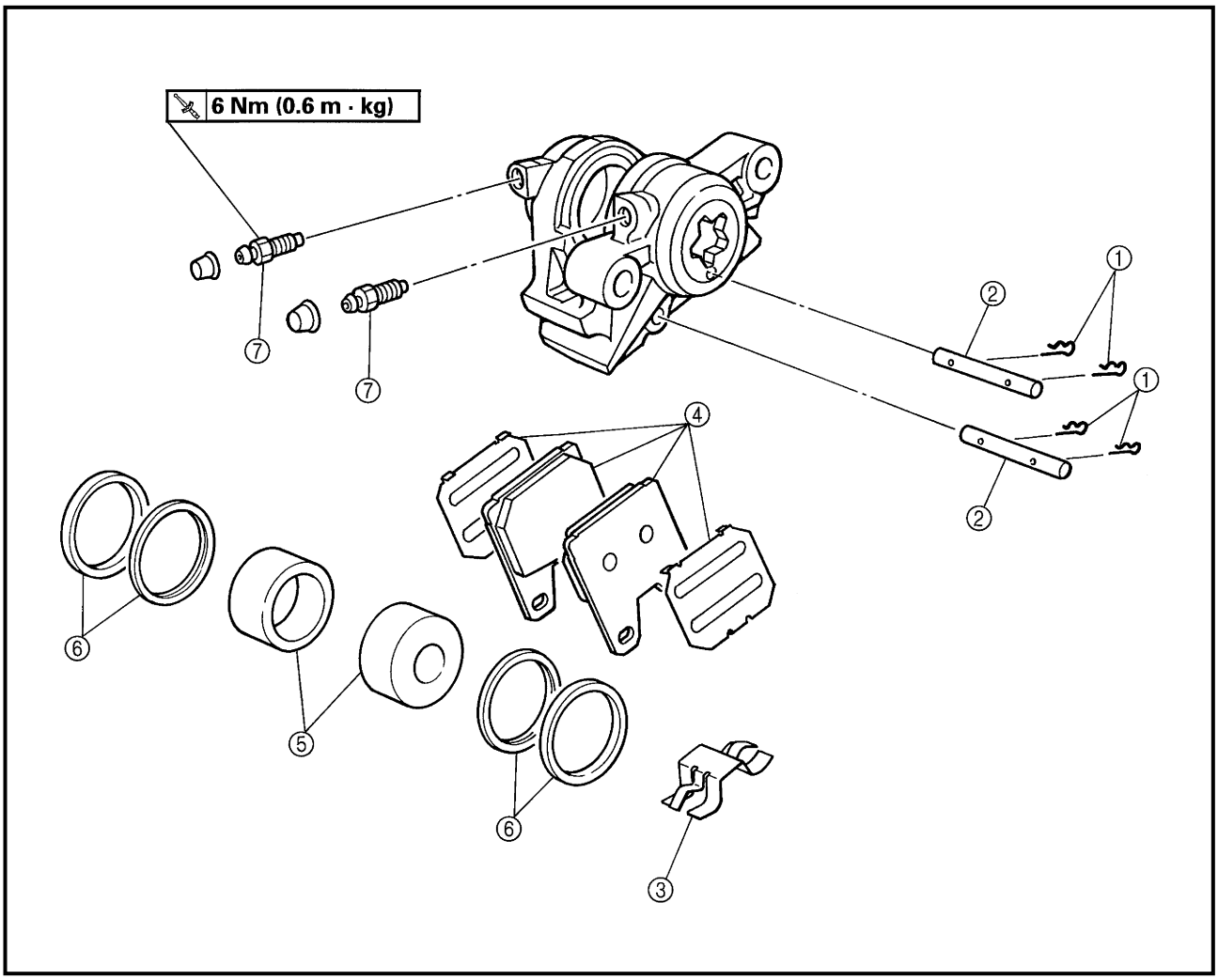
Order	Job/Part	Q'ty	Remarks
	Disassembling the front brake calipers		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers.
①	Brake pad clip	2	
②	Brake pad pin	1	
③	Brake pad spring	1	
④	Brake pad	2	
⑤	Brake caliper piston	4	
⑥	Brake caliper piston seal	8	
⑦	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

EB702304



Order	Job/Part	Q'ty	Remarks
	Removing the rear brake caliper		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Union bolt	1	
2	Copper washer	2	
3	Brake hose	1	
4	Brake caliper	1	
			For installation, reverse the removal procedure.

EB702305

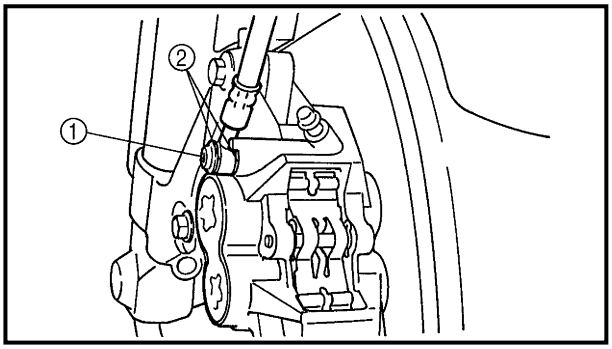


Order	Job/Part	Q'ty	Remarks
	Disassembling the rear brake caliper		Remove the parts in the order listed.
①	Brake pad clip	4	
②	Brake pad pin	2	
③	Brake pad spring	1	
④	Brake pad	2	
⑤	Brake caliper piston	2	
⑥	Brake caliper piston seal	4	
⑦	Bleed screw	2	
			For assembly, reverse the disassembly procedure.

EB702317
DISASSEMBLING THE FRONT BRAKE CALIPERS

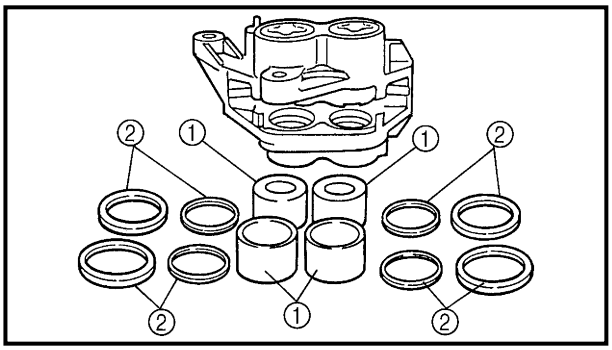
The following procedure applies to both of the brake calipers.

NOTE:
Before disassembling either brake caliper, drain the brake fluid from the entire brake system.



1. Remove:
 - union bolt ①
 - copper washers ②
 - brake hose

NOTE:
Put the end of the brake hose into a container and pump out the brake fluid carefully.



2. Remove:
 - brake caliper pistons ①
 - brake caliper piston seals ②

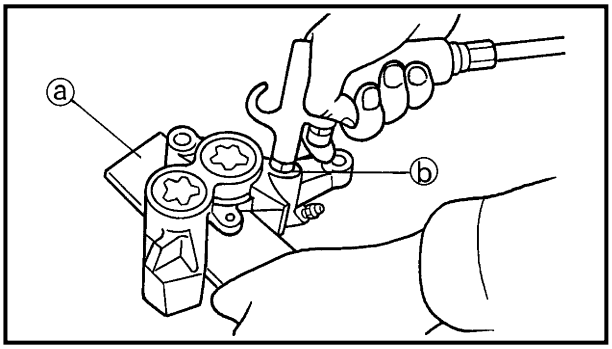
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a. Secure the right side brake caliper pistons with a piece of wood ⓐ.

b. Blow compressed air into the brake hose joint opening ⓑ to force out the left side pistons from the brake caliper.

⚠ WARNING

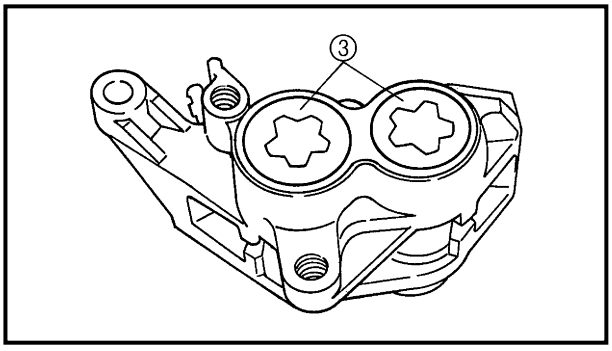
- **Never try to pry out the brake caliper pistons.**
- **Do not loosen the bolts ③.**



c. Remove the brake caliper piston seals.

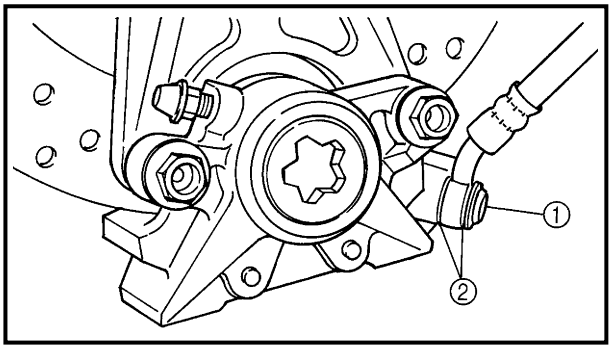
d. Repeat the previous steps to force out the right side pistons from the brake caliper.

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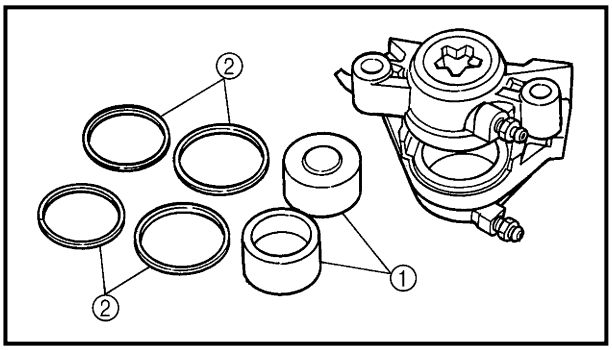
EB702322
DISASSEMBLING THE REAR BRAKE CALIPER

NOTE:
Before disassembling the brake caliper, drain the brake fluid from the entire brake system.



1. Remove:
 - union bolt ①
 - copper washers ②
 - brake hose

NOTE:
Put the end of the brake hose into a container and pump out the brake fluid carefully.



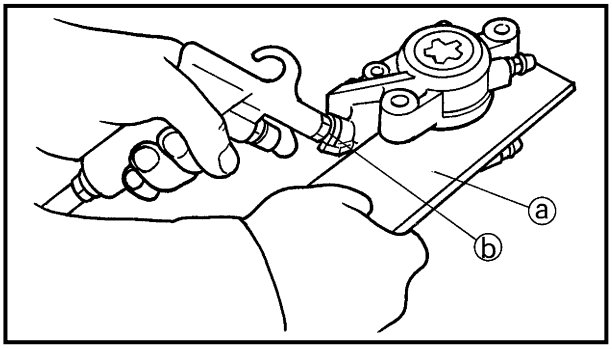
2. Remove:
 - brake caliper pistons ①
 - brake caliper piston seals ②

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a. Secure the right side brake caliper piston with a piece of wood ⓐ.

b. Blow compressed air into the brake hose joint opening ⓑ to force out the left side piston from the brake caliper.

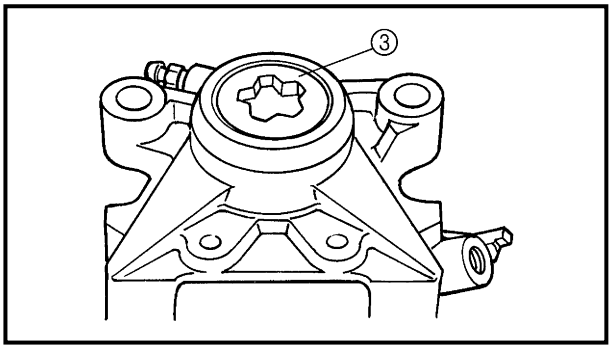
⚠ WARNING
- **Never try to pry out the brake caliper pistons.**
- **Do not loosen the bolt ③.**



c. Remove the brake caliper piston seals.

d. Repeat the previous steps to force out the right side piston from the brake caliper.

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EB702343
CHECKING THE FRONT AND REAR BRAKE CALIPERS

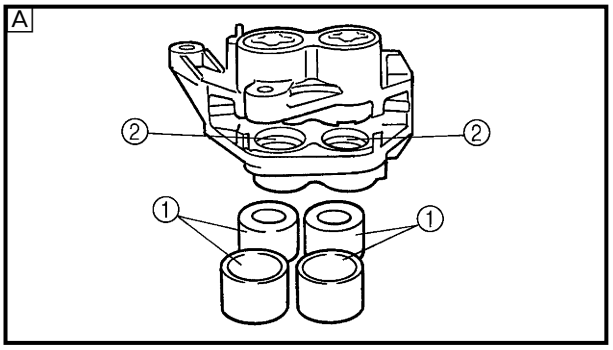
Recommended brake component replacement schedule	
Brake pads	**If necessary**
Piston seals	**Every two years**
Brake hoses	**Every two years**
Brake fluid	**Every two years and whenever the brake is disassembled**

1. Check:
 - brake caliper pistons ①
 Rust/scratches/wear → Replace the brake caliper.
 - brake caliper cylinders ②
 Scratches/wear → Replace the brake caliper.
 - brake calipers
 Cracks/damage → Replace.
 - brake fluid delivery passages (brake caliper body)
 Obstruction → Blow out with compressed air.

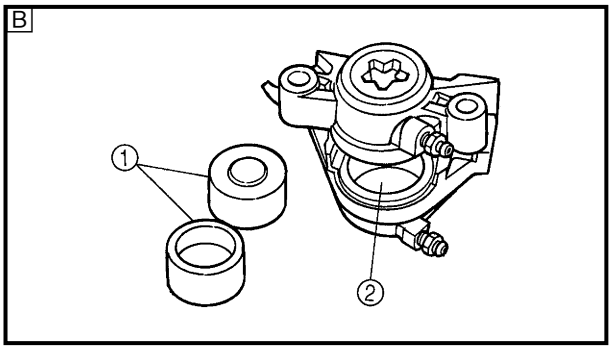
⚠ WARNING

Whenever a brake caliper is disassembled, replace the brake caliper piston seals.

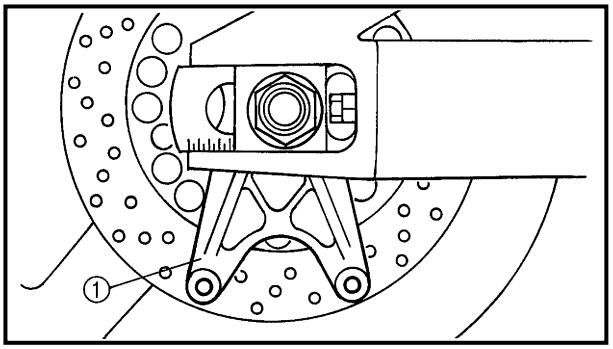
A



B



A Front
B Rear



2. Check:
 - rear brake caliper bracket ①
 Cracks/damage → Replace.

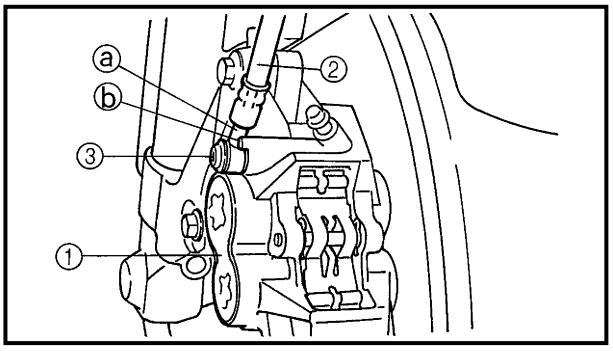
EB702376
ASSEMBLING AND INSTALLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

⚠ WARNING

- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components as they will cause the piston seals to swell and distort.**
- **Whenever a brake caliper is disassembled, replace the brake caliper piston seals.**

Recommended brake fluid
DOT 4



1. Install:
 - brake caliper ① (temporarily)
 - copper washers New
 - brake hose ②
 - union bolt ③ **30 Nm (3.0 m · kg)**

⚠ WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

CAUTION:

When installing the brake hose onto the brake caliper ①, make sure that the brake pipe ⓐ touches the projection ⓑ on the brake caliper.

2. Remove:
 - brake caliper

3. Install:
 - brake pads
 - brake pad spring
 - brake caliper **40 Nm (4.0 m · kg)**
 - brake hose holder **7 Nm (0.7 m · kg)**

 Refer to "REPLACING THE FRONT BRAKE PADS".

4. Fill:
 • brake fluid reservoir
 (with the specified amount of the recommended brake fluid)

Recommended brake fluid
DOT 4

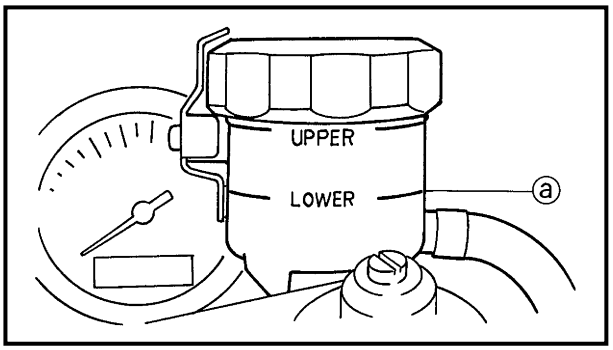
⚠ WARNING

- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

CAUTION:

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

5. Bleed:
 • brake system
 Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.



6. Check:
 • brake fluid level
 Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
 Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

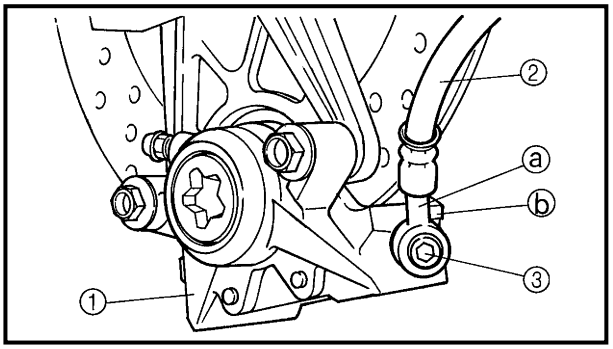
7. Check:
 • brake lever operation
 Soft or spongy feeling → Bleed the brake system.
 Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

EB702378
ASSEMBLING AND INSTALLING THE REAR BRAKE CALIPER

⚠ WARNING

- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components as they will cause the piston seals to swell and distort.**
- **Whenever a brake caliper is disassembled, replace the brake caliper piston seals.**

Recommended brake fluid
DOT 4



1. Install:
 - brake caliper ① (temporarily)
 - copper washers New
 - brake hose ②
 - union bolt ③ **30 Nm (3.0 m · kg)**

⚠ WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

CAUTION:

When installing the brake hose onto the brake caliper ①, make sure that the brake pipe ⓐ touches the projection ⓑ on the brake caliper.

2. Remove:
 - brake caliper
3. Install:
 - brake pads
 - brake pad springs
 - brake caliper **40 Nm (4.0 m · kg)**
 - brake hose holder **7 Nm (7.0 m · kg)**

 Refer to "REPLACING THE REAR BRAKE PADS".

4. Fill:
 • brake fluid reservoir
 (with the specified amount of the recommended brake fluid)

	Recommended brake fluid **DOT 4**

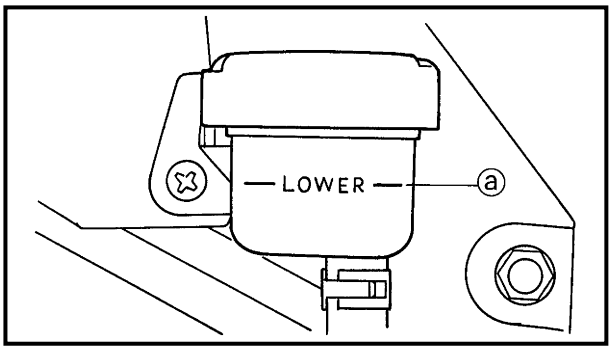
⚠ WARNING

- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

CAUTION:

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

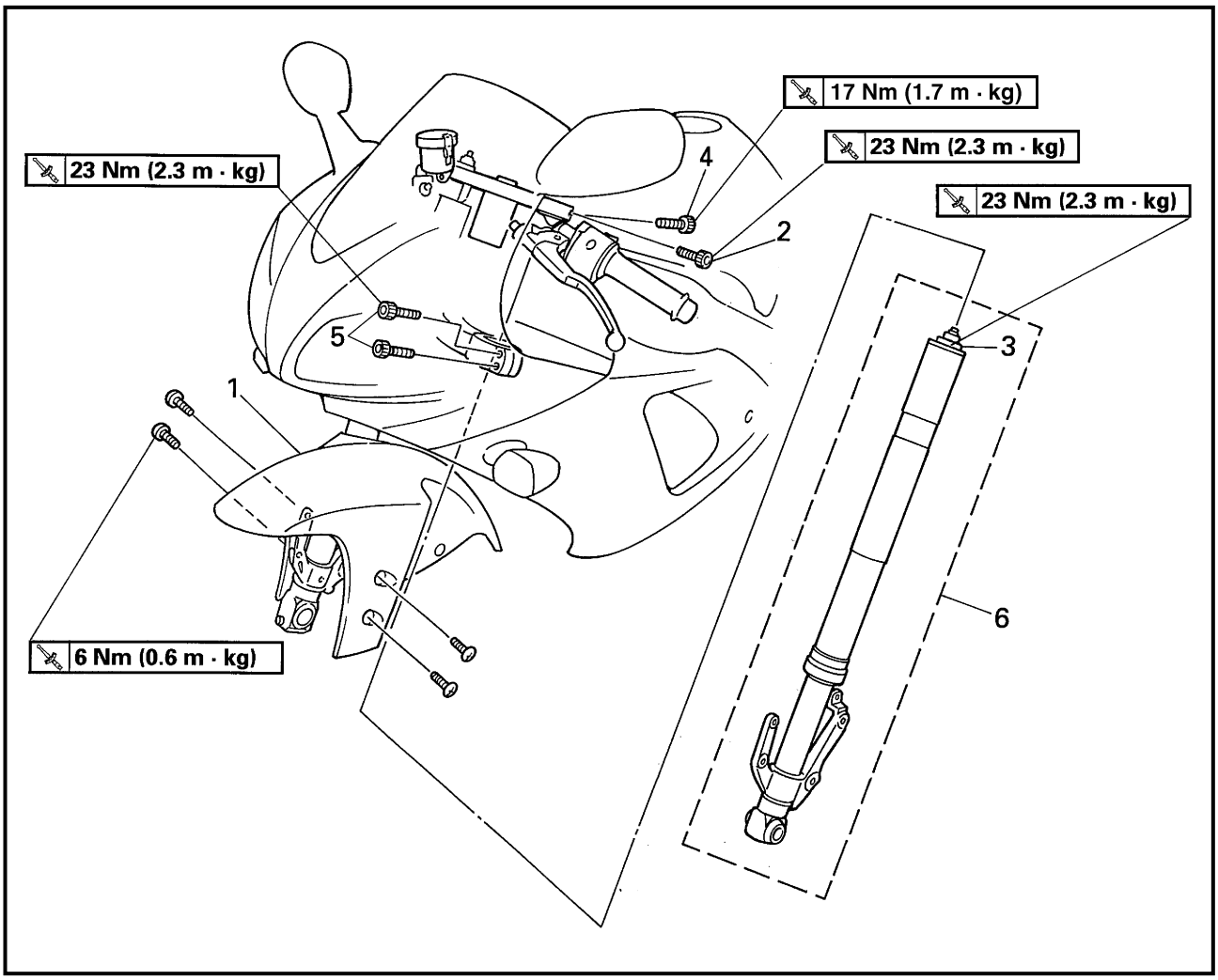
5. Bleed:
 • brake system
 Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.



6. Check:
 • brake fluid level
 Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
 Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

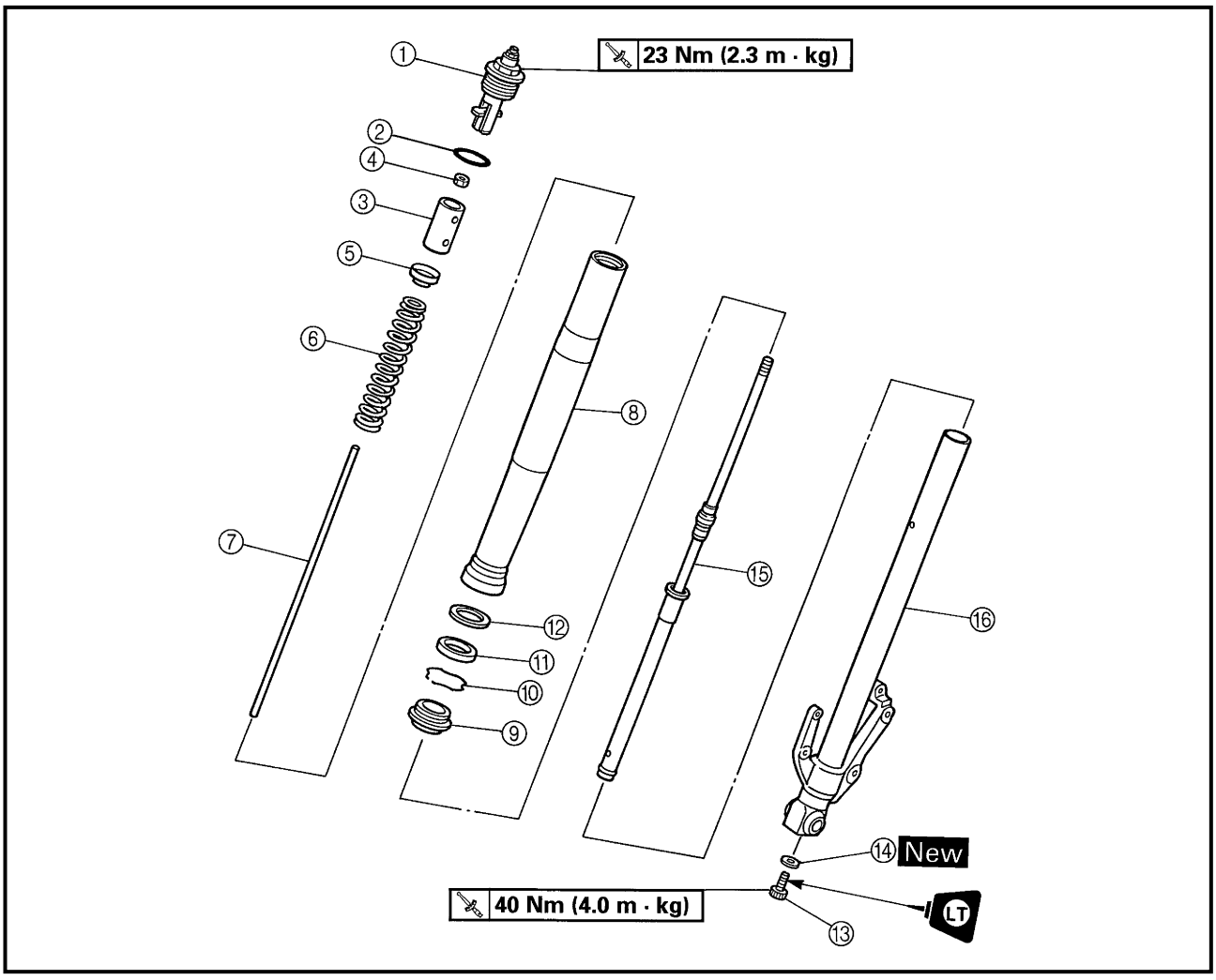
7. Check:
 • brake pedal operation
 Soft or spongy feeling → Bleed the brake system.
 Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

EB703001
FRONT FORK

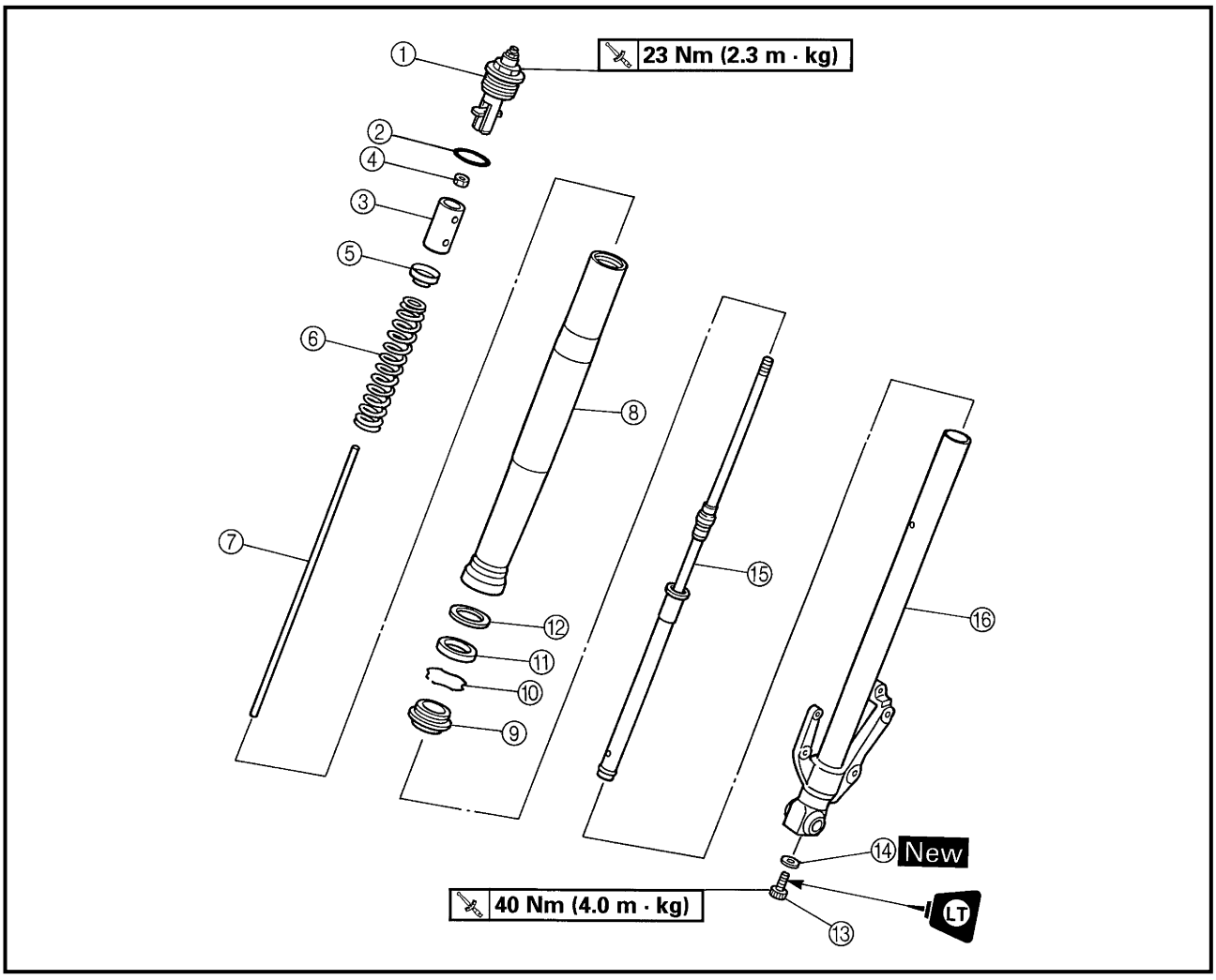


Order	Job/Part	Q'ty	Remarks
	Removing the front fork legs		Remove the parts in the order listed.
			The following procedure applies to both of the front fork legs.
	Front wheel		Refer to "FRONT WHEEL AND BRAKE DISCS".
	Front cowling inner panels		Refer to "COWLINGS" in chapter 3.
1	Front fender	1	
2	Upper bracket pinch bolt	1	
3	Cap bolt	1	
4	Handlebar pinch bolt	1	
5	Lower bracket pinch bolt	2	
6	Front fork leg	1	
			For installation, reverse the removal procedure.

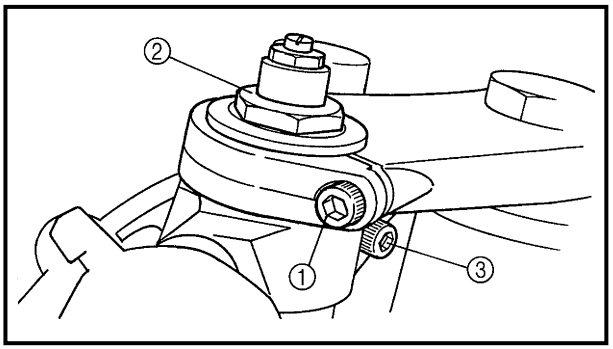
EB703002



Order	Job/Part	Q'ty	Remarks
	Disassembling the front fork legs		Remove the parts in the order listed. The following procedure applies to both of the front fork legs.
①	Cap bolt	1	
②	O-ring	1	
③	Spacer	1	
④	Nut	1	
⑤	Spring seat	1	
⑥	Fork spring	1	
⑦	Damper adjusting rod	1	
⑧	Outer tube	1	
⑨	Dust seal	1	
⑩	Oil seal clip	1	
⑪	Oil seal	1	
⑫	Washer	1	



Order	Job/Part	Q'ty	Remarks
⑬	Damper rod assembly bolt	1	
⑭	Copper washer	1	
⑮	Damper rod assembly	1	
⑯	Inner tube	1	
			For assembly, reverse the disassembly procedure.



EB703100
REMOVING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

NOTE:

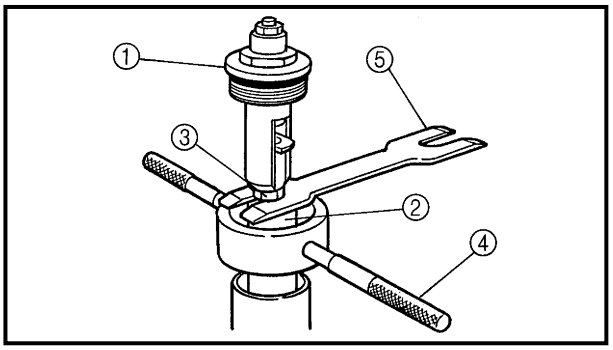
Place the motorcycle on a suitable stand so that the front wheel is elevated.

2. Loosen:
 - upper bracket pinch bolt ①
 - cap bolt ②
 - handlebar boss pinch bolt ③
 - lower bracket pinch bolts

⚠ WARNING

Before loosening the upper and lower bracket pinch bolts and handlebar pinch bolt, support the front fork leg.

3. Remove:
 - front fork leg



EB703113
DISASSEMBLING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

1. Remove:
 - cap bolt ①
 (from the damper adjusting rod)
 - spacer ②
 - nut ③

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a. Press down on the spacer with the fork spring compressor ④.

b. Install the rod holder ⑤ between the nut ③ and the spacer ②.



Fork spring compressor
90890-01441
Rod holder
90890-01434

NOTE:
Use the side of the rod holder that is marked “B”.

c. Loosen the nut.

d. Remove the cap bolt.

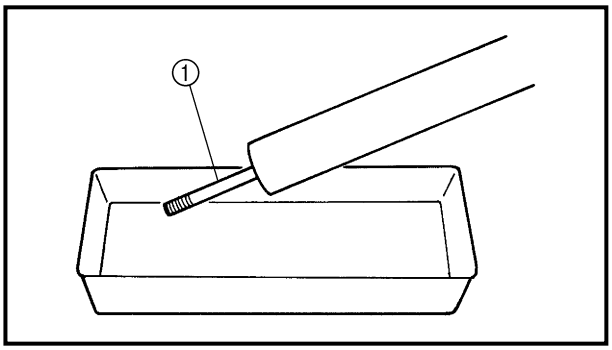
e. Remove the rod holder and fork spring compressor

⚠ WARNING

The fork spring is compressed.

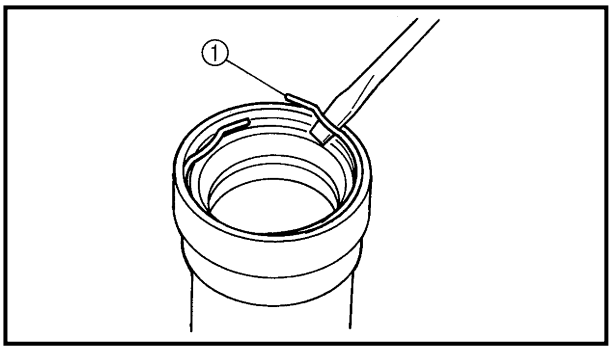
f. Remove the spacer and nut.

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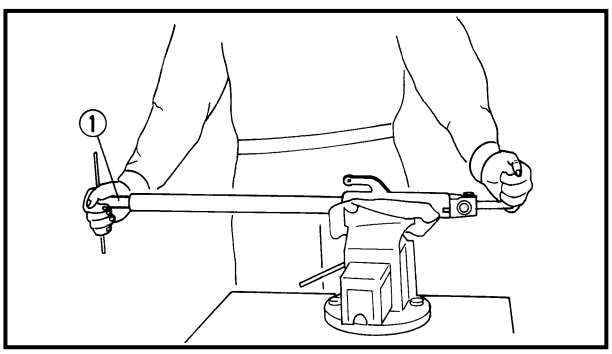


2. Drain:
 • fork oil

NOTE:
Stroke the damper rod ① several times while draining the fork oil.



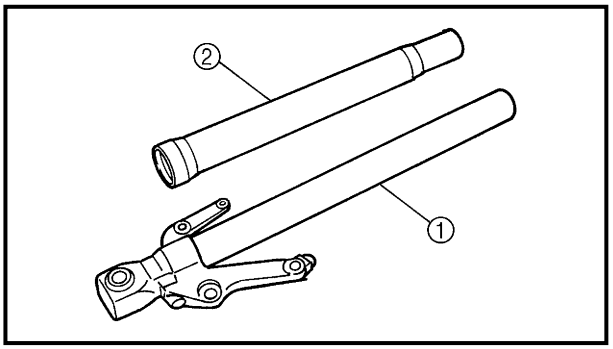
3. Remove:
 • dust seal
 • oil seal clip ①
 • oil seal
 • washer
 (with a flat-head screwdriver)



4. Remove:
 • damper rod assembly bolt
 • copper washer

NOTE:
While holding the damper rod with the damper rod holder ①, loosen the damper rod assembly bolt.

	**Damper rod holder** **90890-01423**



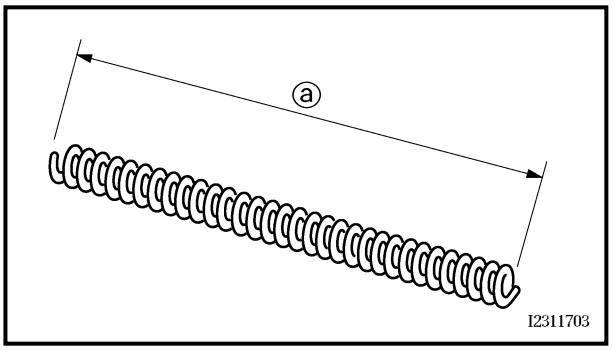
EB703401
CHECKING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

1. Check:
 - inner tube ①
 - outer tube ②
 Bends/damage/scratches → Replace.

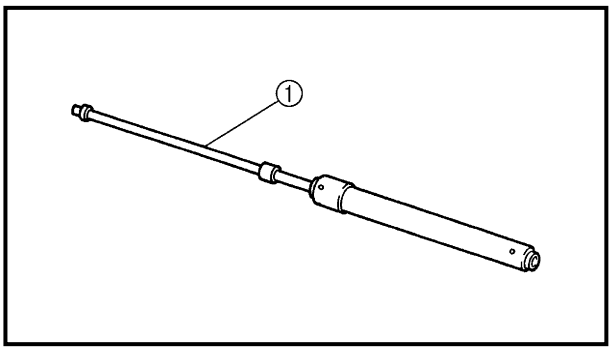
⚠ WARNING

Do not attempt to straighten a bent inner tube as this may dangerously weaken it.



2. Measure:
 - spring free length ⓐ
 Out of specification → Replace.

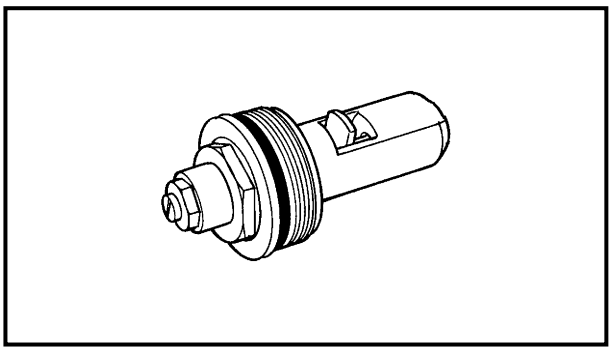
Spring free length limit
255 mm



3. Check:
 - damper rod ①
 Damage/wear → Replace.
 Obstruction → Blow out all of the oil passages with compressed air.

CAUTION:

- **The front fork leg has a built-in damper adjusting rod and a very sophisticated internal construction, which are particularly sensitive to foreign material.**
- **When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.**



4. Check:
 • cap bolt O-ring
 Damage/wear → Replace.

EB703702
ASSEMBLING THE FRONT FORK LEGS

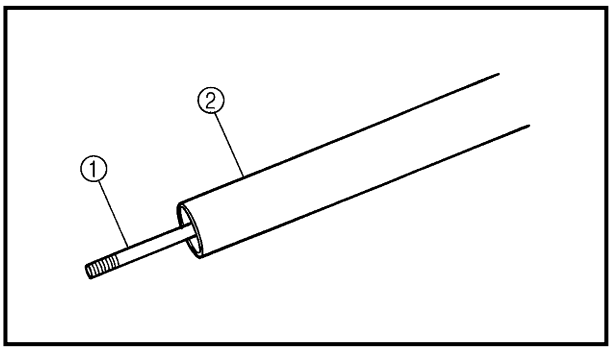
The following procedure applies to both of the front fork legs.

⚠ WARNING

• Make sure that the oil levels in both front fork legs are equal.
• Uneven oil levels can result in poor handling and a loss of stability.

NOTE:

• When assembling the front fork leg, be sure to replace the following parts:
 - inner tube bushing
 - outer tube bushing
 - oil seal
 - dust seal
• Before assembling the front fork leg, make sure that all of the components are clean.



1. Install:
 • damper rod assembly ①

⚠ WARNING

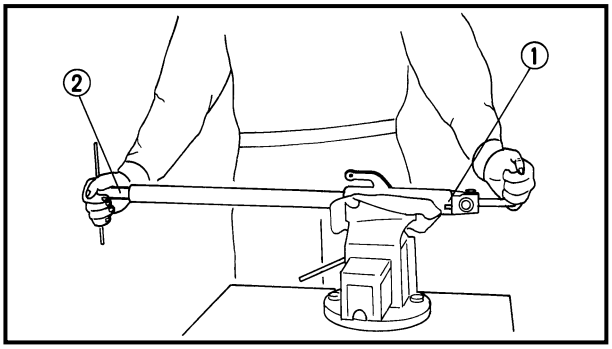
Always use new copper washers.

CAUTION:

Allow the damper rod assembly to slide slowly down the inner tube ② until it protrudes from the bottom of the inner tube. Be careful not to damage the inner tube.

2. Lubricate:
 • inner tube's outer surface

Recommended lubricant
Yamaha fork and shock oil 01 or equivalent



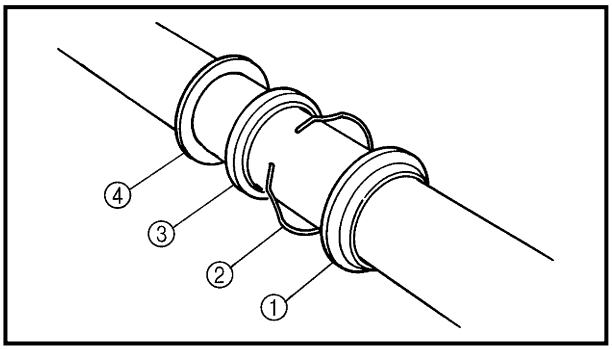
3. Tighten:
 • damper rod assembly bolt ①

40 Nm (4.0 m · kg)

NOTE:
While holding the damper rod with the damper rod holder ②, tighten the damper rod assembly bolt.



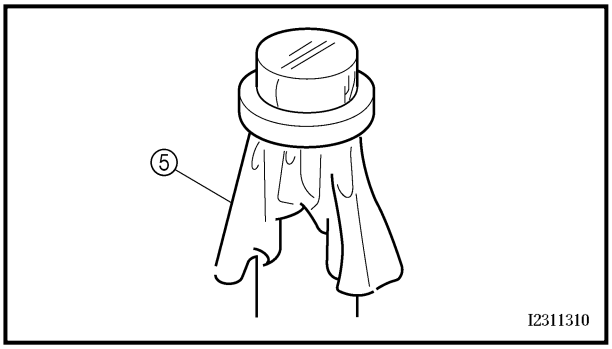
Damper rod holder
90890-01423



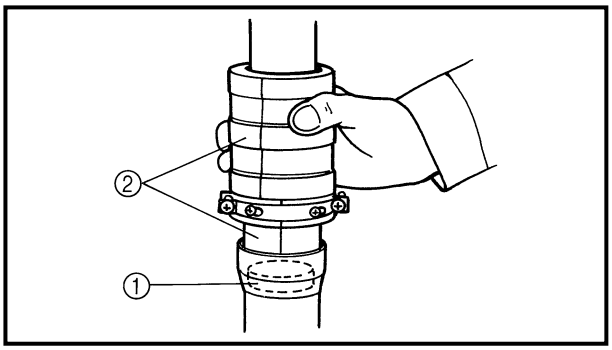
4. Install:
 • dust seal ①
 • oil seal clip ②
 • oil seal ③
 • washer ④

CAUTION:
Make sure that the numbered side of the oil seal faces up.

NOTE:
- Before installing the oil seal, lubricate its lips with lithium soap base grease.
- Lubricate the outer surface of the inner tube with fork oil.
- Before installing the oil seal, cover the top of the front fork leg with a plastic bag ⑤ to protect the oil seal during installation.



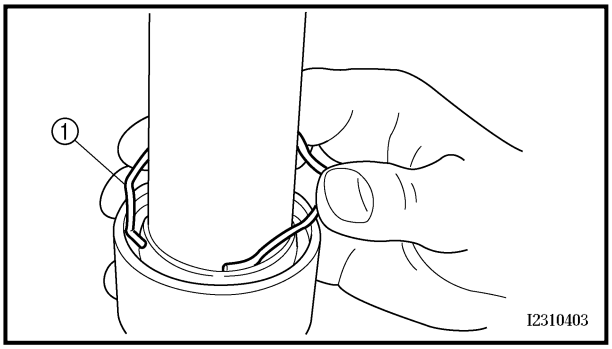
5. Install:
 • outer tube
 (onto the inner tube)



6. Install:
 • washer
 • oil seal ①
 (with the fork seal driver ②)

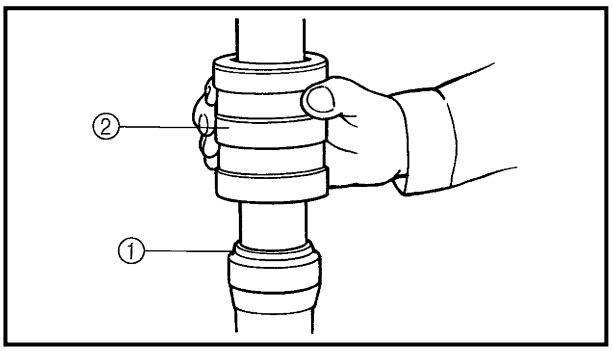


Fork seal driver
90890-01442

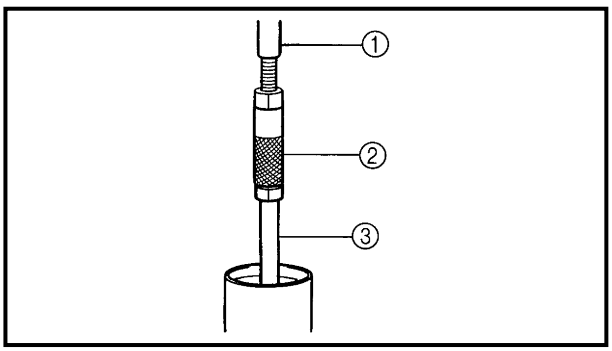


7. Install:
 • oil seal clip ①

NOTE:
Adjust the oil seal clip so that it fits into the outer tube's groove.



8. Install:
 • dust seal ①
 (with the fork seal driver ②)



9. Install:
 • rod puller ①
 • adapter ②
 (onto the damper rod ③)

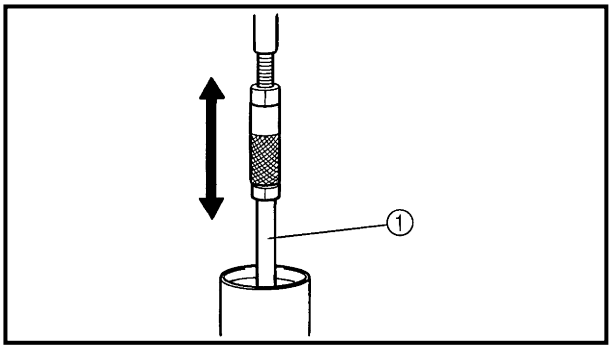
Rod puller
90890-01437
Adapter
90890-01436

10. Fully compress the front fork leg.

11. Fill:
 • front fork leg
 (with the specified amount of the recommended fork oil)

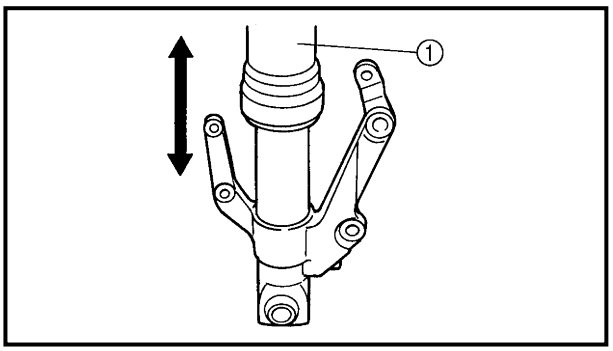
Quantity (each front fork leg)
477 cm³
Recommended oil
Yamaha fork and shock oil 01 or equivalent

CAUTION:
- **Be sure to use the recommended fork oil. Other oils may have an adverse effect on front fork performance.**
- **When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.**



12. After filling the front fork leg, slowly stroke the damper rod ① up and down (at least ten times) to distribute the fork oil.

NOTE:
Be sure to stroke the damper rod slowly because the fork oil may spurt out.

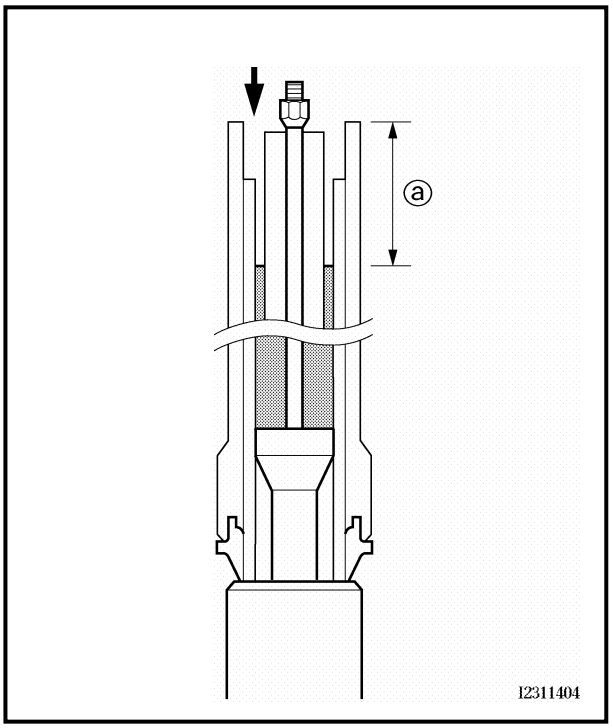


13. Slowly stroke the outer tube ① up and down to distribute the fork oil once more (1 stroke = about 100 mm).

NOTE:
Be careful not to stroke the inner tube over 100 mm as this will cause air to enter. If the inner tube is stroked more than 100 mm, repeat steps (12) and (13).

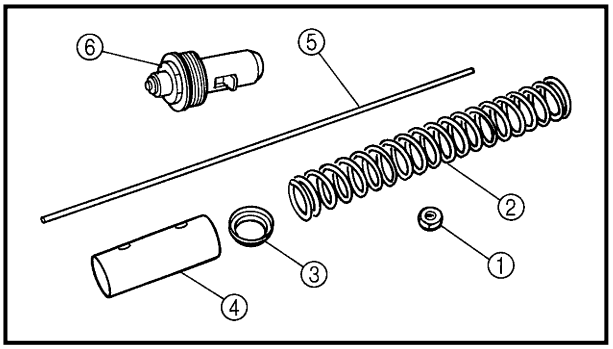
14. Before measuring the fork oil level, wait ten minutes until the oil has settled and the air bubbles have dispersed.

NOTE:
Be sure to bleed the front fork leg of any residual air.



15. Measure:
- front fork leg oil level ⓐ
 Out of specification → Correct.

Front fork leg oil level (from the top of the inner tube, with the inner tube fully compressed, and without the spring)
78 mm

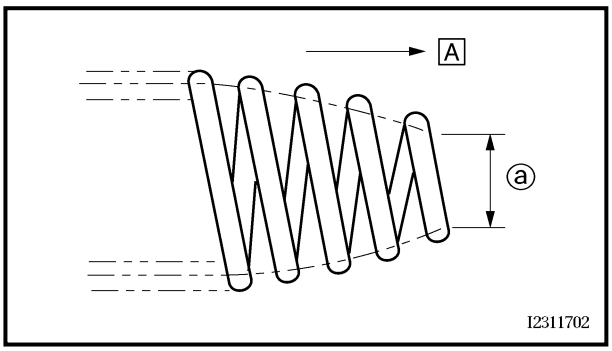


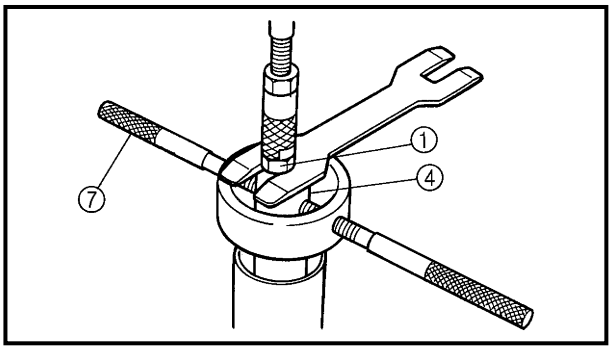
16. Install:
- nut ①
- fork spring ②
- spring seat ③
- spacer ④
- damper adjusting rod ⑤
- cap bolt ⑥

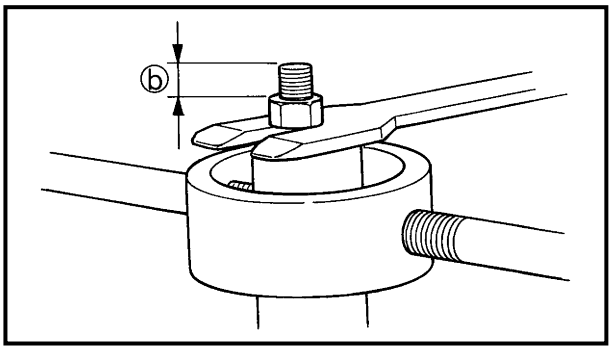
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a. Remove the rod puller and adapter.

b. Install the nut.







c. Install the rod puller and adapter onto the damper rod.

Rod puller
90890-01437
Adapter
90890-01436

d. Install the fork spring, spring seat, and spacer.

NOTE:
Install the spring with the smaller pitch ⓐ facing up A.

e. Press down on the spacer with the fork spring compressor ⑦.

f. Pull up the rod puller and install the rod holder ⑧ between the nut ① and the spacer ④.

NOTE:
Use the side of the rod holder that is marked “B”.

Fork spring compressor
90890-01441
Rod holder
90890-01434

g. Remove the rod puller and adapter.

h. Install the nut ① and position it as specified ⓑ.

Distance ⓑ
11 mm

i. Install the damper adjusting rod and cap bolt, and then finger tighten the cap bolt.

j. Hold the cap bolt and tighten the nut to specification.

Nut
15 Nm (1.5 m • kg)

k. Remove the rod holder and fork spring compressor.

⚠ WARNING

- **The fork spring is compressed.**
- **Always use a new cap bolt O-ring.**

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17. Install:
 • outer tube
 (onto the inner tube)

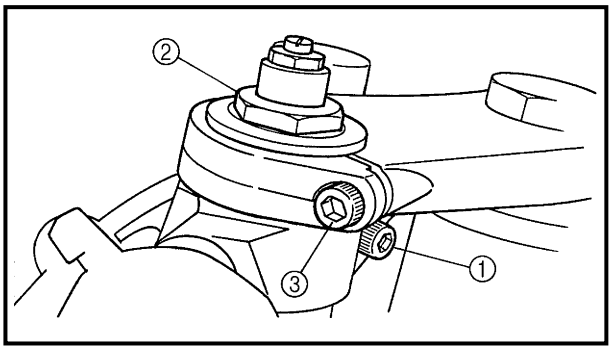
NOTE:
Temporarily tighten the cap bolt.

EB703710
INSTALLING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

1. Install:
 • front fork leg
 Temporarily tighten the upper and lower bracket pinch bolts.

NOTE:
Make sure that the inner fork tube is flush with the top of the handlebar holder.



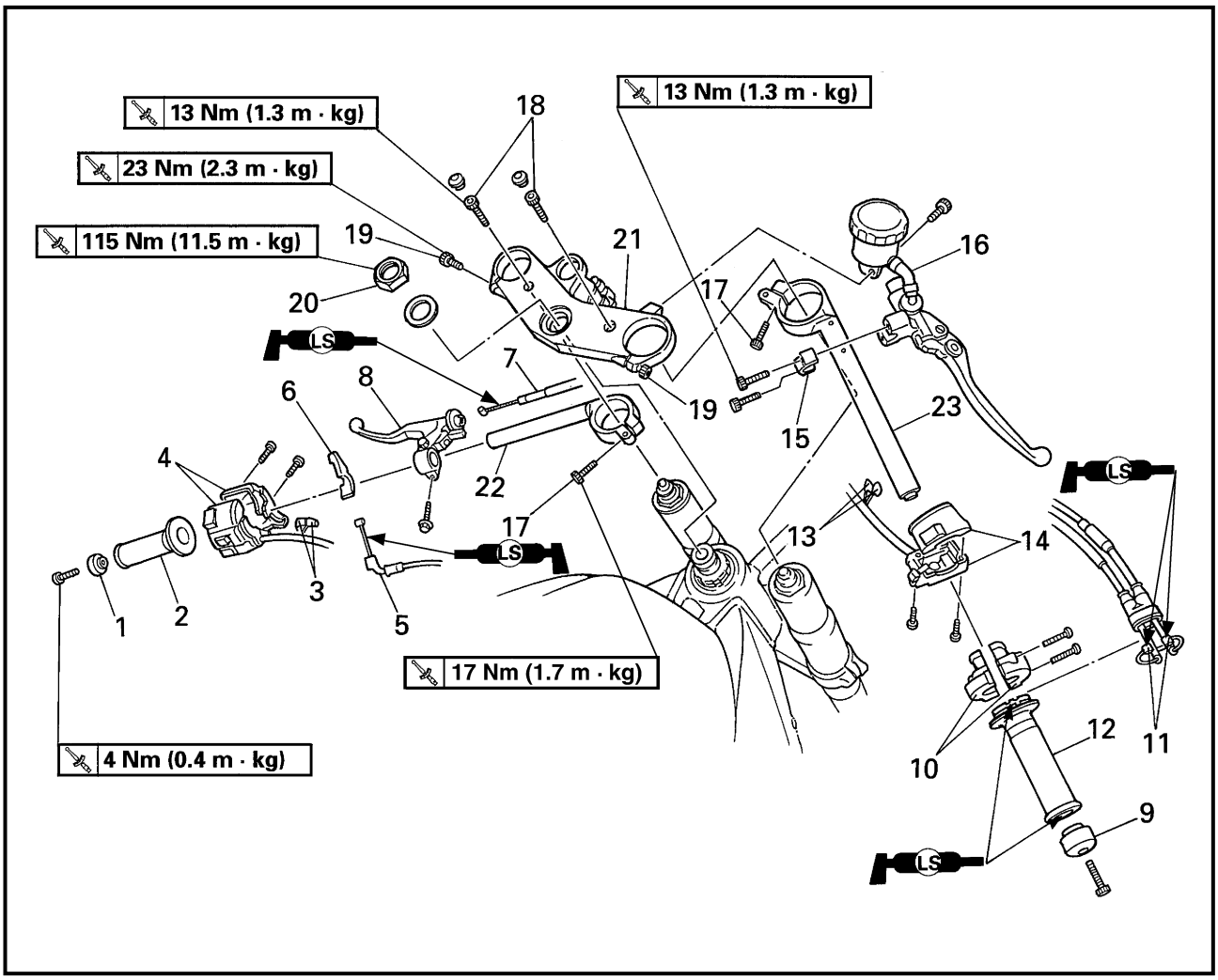
2. Tighten:
 • lower bracket pinch bolt
 23 Nm (2.3 m · kg)
 • handlebar pinch bolt ①
 17 Nm (1.7 m · kg)
 • cap bolt ②
 23 Nm (2.3 m · kg)
 • upper bracket pinch bolt ③
 23 Nm (2.3 m · kg)

⚠ WARNING

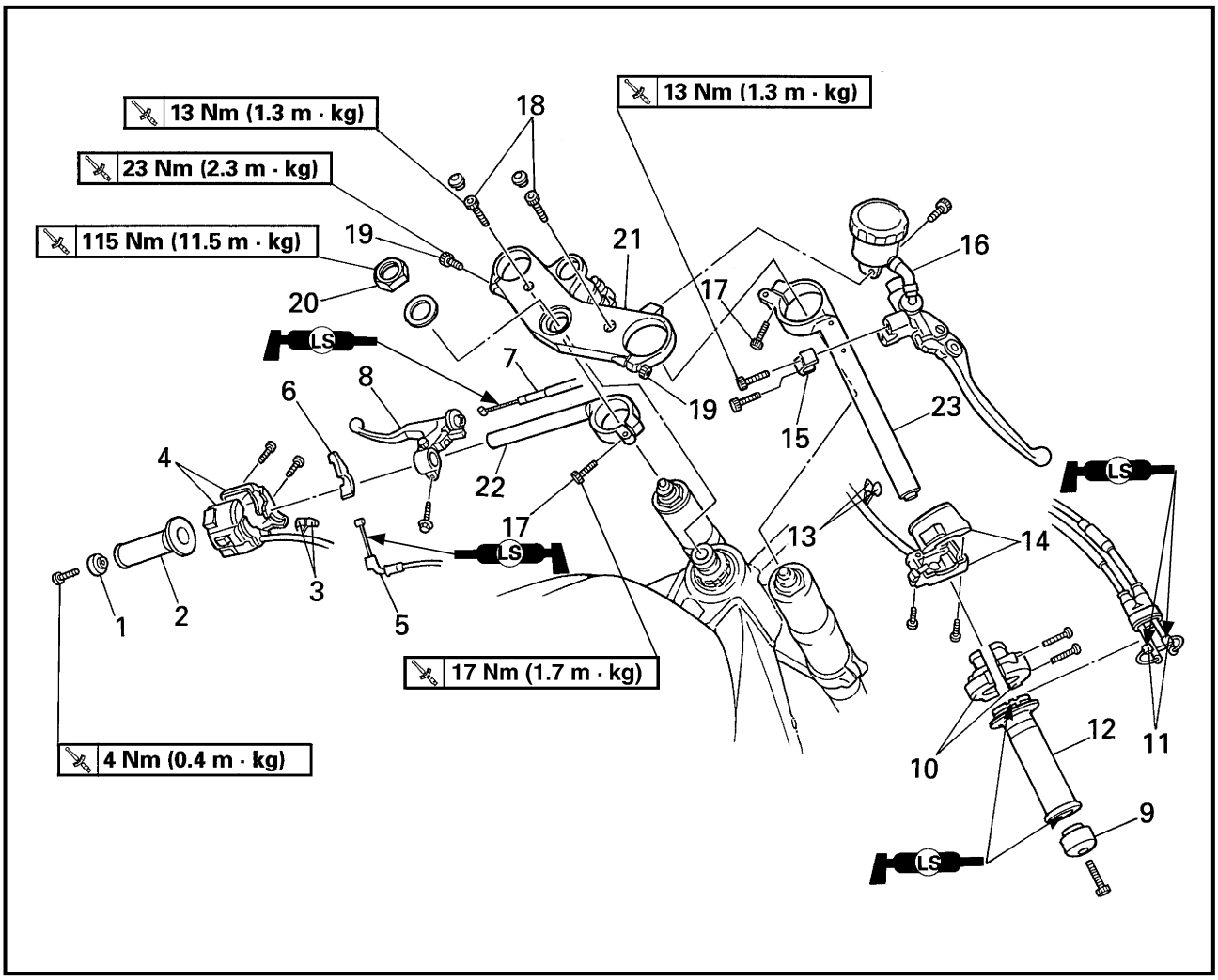
Make sure that the brake hoses are routed properly.

3. Adjust:
 • spring preload
 • rebound damping
 • compression damping
 Refer to “ADJUSTING THE FRONT FORK LEGS” in chapter 3.

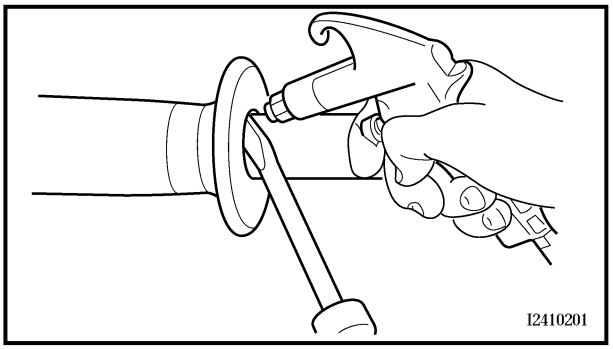
EB704001
HANDLEBARS



Order	Job/Part	Q'ty	Remarks
	Removing the handlebars		Remove the parts in the order listed.
1	Left grip end	1	
2	Handlebar grip	1	
3	Clutch switch connector	2	Disconnect.
4	Left handlebar switch	1	
5	Starter cable	1	Disconnect.
6	Starter lever	1	
7	Clutch cable	1	Disconnect.
8	Clutch lever	1	
9	Right grip end	1	
10	Throttle cable housing	1	
11	Throttle cable	2	
12	Throttle grip	1	



Order	Job/Part	Q'ty	Remarks
13	Front brake switch connector	2	Disconnect.
14	Right handlebar switch	1	
15	Brake master cylinder holder	1	
16	Brake master cylinder	1	
17	Handlebar pinch bolt	2	
18	Upper bracket bolt	2	
19	Upper bracket pinch bolt	2	
20	Steering stem nut	1	
21	Upper bracket	1	
22	Left handlebar	1	
23	Right handlebar	1	
			For installation, reverse the removal procedure.



EB704101
REMOVING THE HANDLEBARS

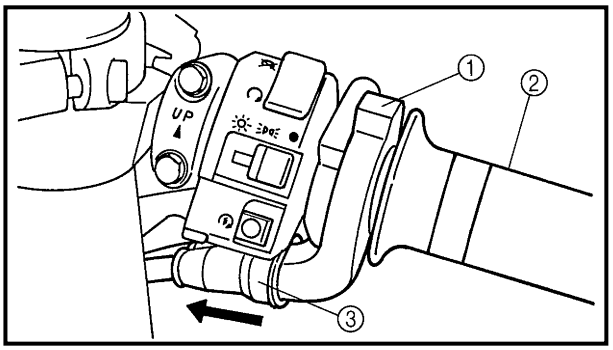
1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

2. Remove:
 • handlebar grip

NOTE:
Blow compressed air between the left handlebar and the handlebar grip, and gradually push the grip off the handlebar.



3. Remove:
 • throttle cable housing ①
 • throttle grip ②

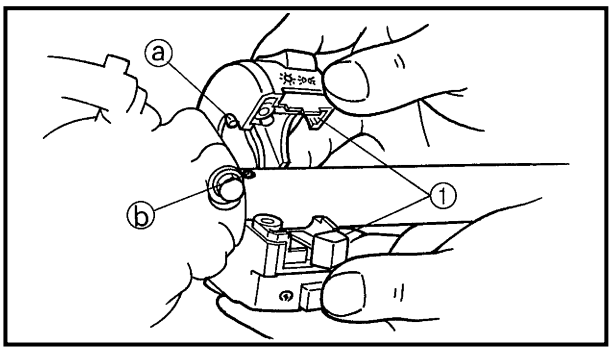
NOTE:
Pull back the rubber cover ③ when removing the throttle cable housing.

EB704401
CHECKING THE HANDLEBARS

1. Check:
 • left handlebar
 • right handlebar
 Bends/cracks/damage → Replace.

⚠ WARNING

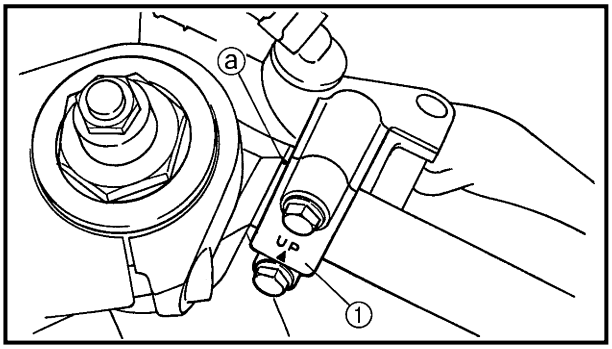
Do not attempt to straighten bent handlebars as this may dangerously weaken them.



EB704704
INSTALLING THE HANDLEBARS

1. Install:
 • right handlebar switch ①

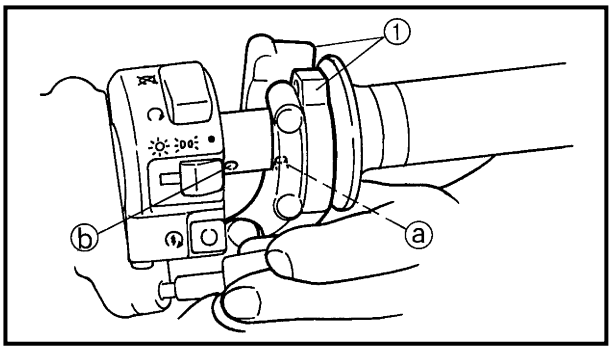
NOTE:
Align the projection ⓐ on the right handlebar switch with the hole ⓑ in the right handlebar.



2. Install:
 • brake master cylinder holder ①

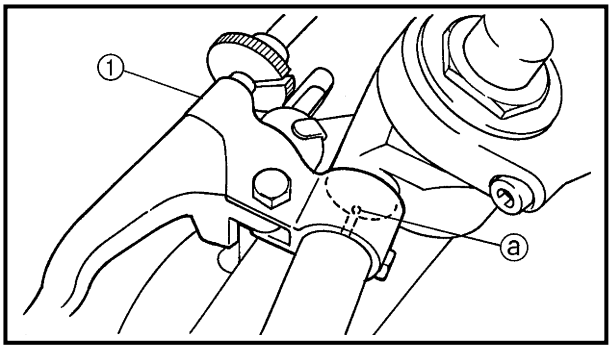
CAUTION:
- **Install the brake master cylinder holder with the "UP" mark facing up.**
- **First, tighten the upper bolt, then the lower bolt.**

NOTE:
- Align the mating surfaces of the brake master cylinder holder with the punch mark ⓐ in the right handlebar.
- There should be 2 mm of clearance between the right handlebar switch and the brake master cylinder holder.



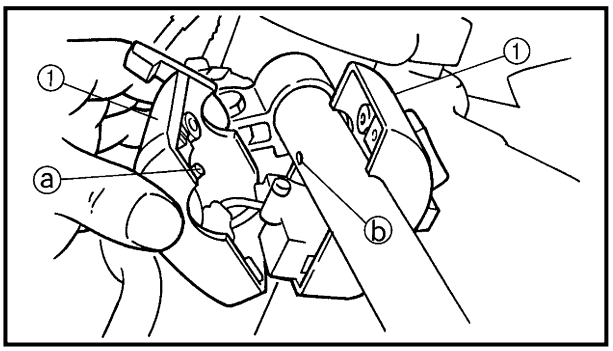
3. Install:
 • throttle grip ①
 • throttle cable housing ②
 • throttle cables

NOTE:
Align the projection ⓐ on the throttle cable housing with the hole ⓑ in the right handlebar.



4. Install:
 • clutch lever holder ①

NOTE:
Align the slit in the clutch lever holder with the punch mark ⓐ in the left handlebar.



5. Install:
 • left handlebar switch ①

NOTE:
Align the projection ⓐ on the left handlebar switch with the hole ⓑ in the left handlebar.

6. Install:
 • handlebar grip

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a. Apply a thin coat of rubber adhesive onto the end of the left handlebar.

b. Slide the handlebar grip over the end of the left handlebar.

c. Wipe off any excess rubber adhesive with a clean rag.

⚠ WARNING

Do not touch the handlebar grip until the rubber adhesive has fully dried.

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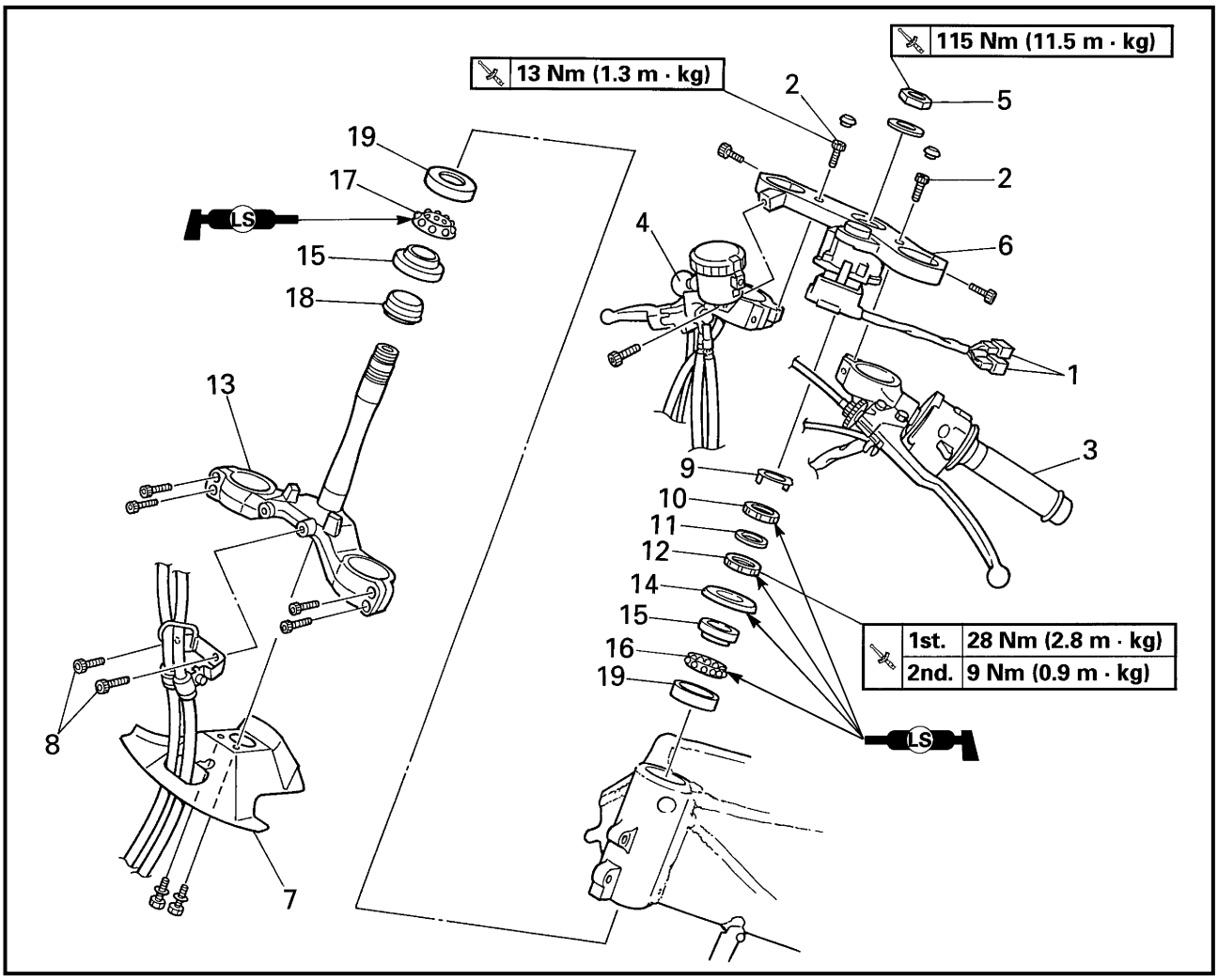
7. Adjust:
 • clutch cable free play
 Refer to "ADJUSTING THE CLUTCH CABLE FREE PLAY" in chapter 3.

Clutch cable free play (at the end of the clutch lever)
10 ~ 15 mm

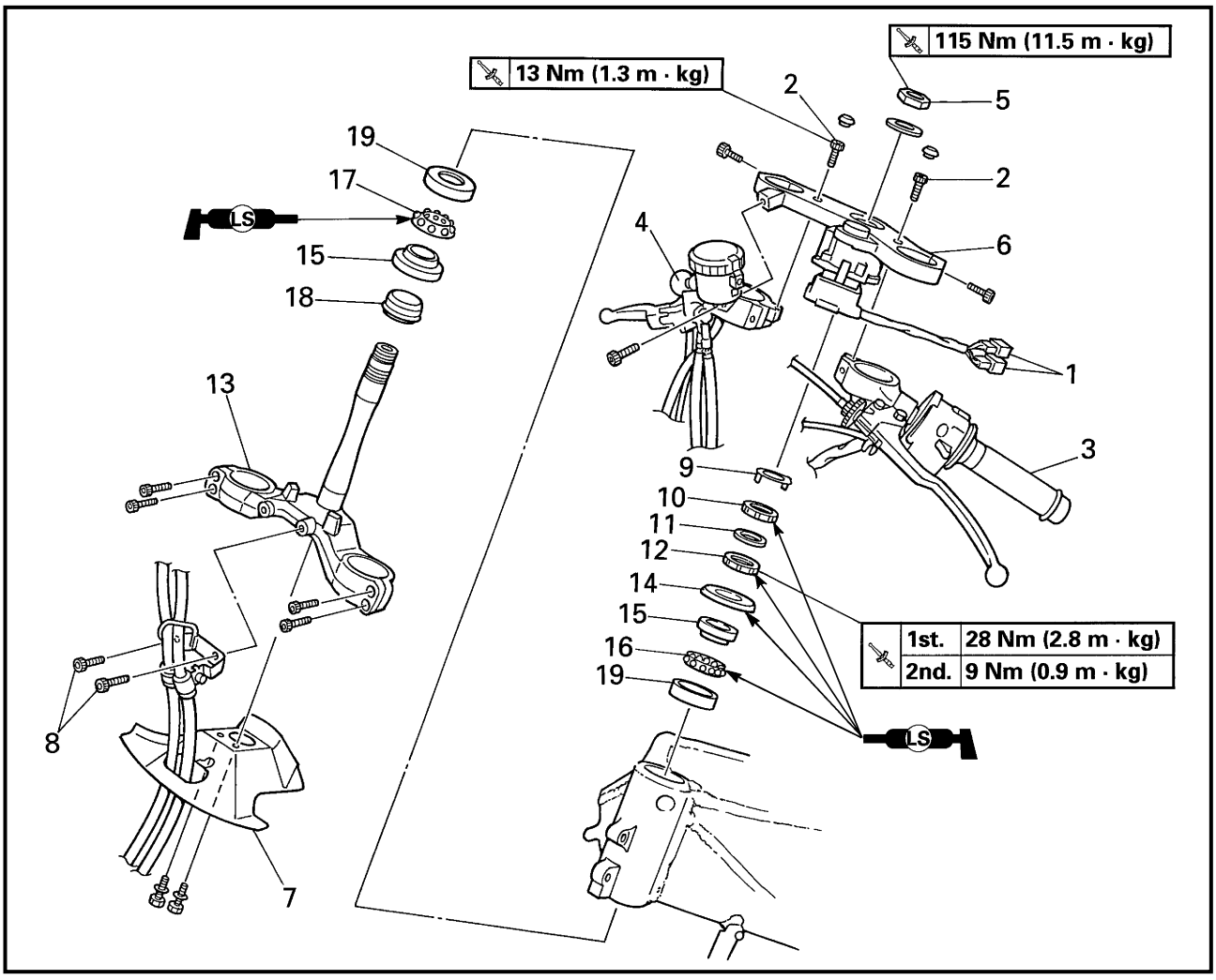
8. Adjust:
 • throttle cable free play
 Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY" in chapter 3.

Throttle cable free play (at the flange of the throttle grip)
3 ~ 5 mm

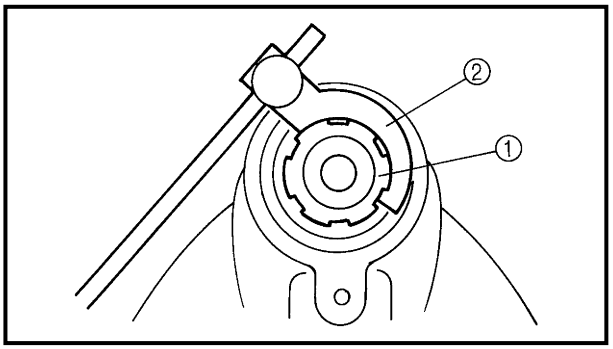
EB705001
STEERING HEAD



Order	Job/Part	Q'ty	Remarks
	Removing the lower bracket		Remove the parts in the order listed.
	Front wheel		Refer to "FRONT WHEEL AND BRAKE DISCS".
	Front fork legs		Refer to "FRONT FORK".
1	Main switch coupler	2	Disconnect.
2	Upper bracket bolt	2	
3	Left handlebar assembly	1	
4	Right handlebar assembly	1	
5	Steering stem nut	1	
6	Upper bracket	1	
7	Lower bracket panel	1	
8	Brake hose holder bolt	2	
9	Lock washer	1	
10	Upper ring nut	1	
11	Rubber washer	1	



Order	Job/Part	Q'ty	Remarks
12	Lower ring nut	1	
13	Lower bracket	1	
14	Bearing cover	1	
15	Bearing inner race	2	
16	Upper bearing	1	
17	Lower bearing	1	
18	Dust seal	1	
19	Bearing outer race	2	
			For installation, reverse the removal procedure.



EB705100
REMOVING THE LOWER BRACKET

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

2. Remove:
 • lower ring nut ①
 (with the special tool ②)

	Ring nut wrench **90890-01403**

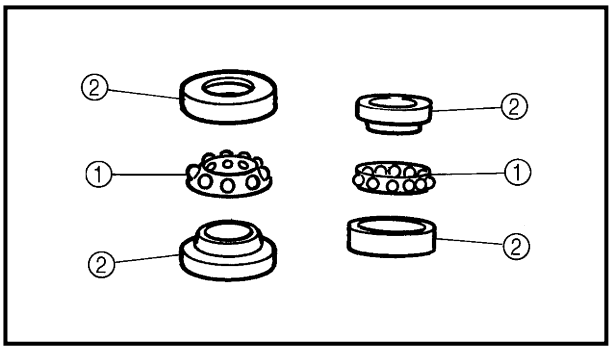
⚠ WARNING

Securely support the lower bracket so that there is no danger of it falling.

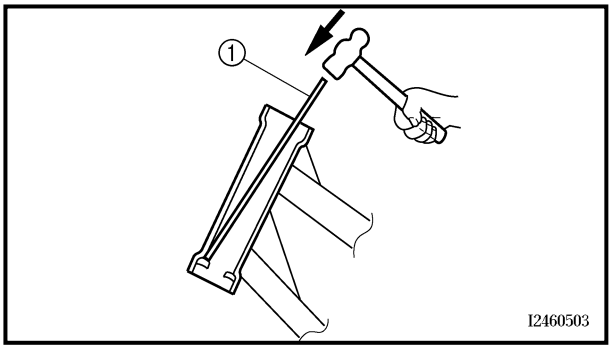
EB705401
CHECKING THE STEERING HEAD

1. Wash:
 • bearing balls
 • bearing races

	Recommended cleaning solvent **Kerosine**



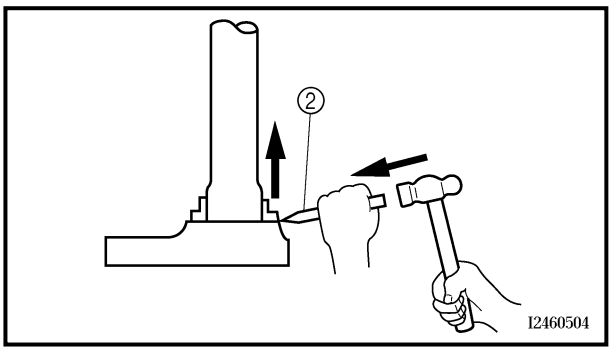
2. Check:
 • bearing balls ①
 • bearing races ②
 Damage/pitting → Replace.



3. Replace:
 • bearing balls
 • bearing races

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a. Remove the bearing races from the steering head pipe with a long rod ① and hammer.



b. Remove the bearing race from the lower bracket with a floor chisel ② and hammer.

c. Install a new dust seal and new bearing races.

CAUTION:

If the bearing race is not installed properly, the steering head pipe could be damaged.

NOTE:

- Always replace the bearing balls and bearing races as a set.
- Whenever the steering head is disassembled, replace the dust seal.

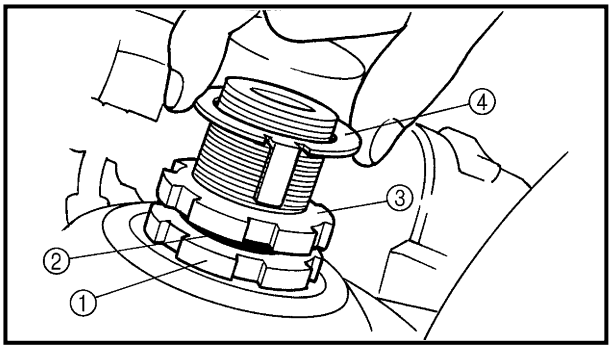
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4. Check:
 - upper bracket
 - lower bracket
 (along with the steering stem)
 Bends/cracks/damage → Replace.

EB705700
INSTALLING THE STEERING HEAD

1. Lubricate:
 - upper bearing
 - lower bearing
 - bearing races

	Recommended lubricant **Lithium soap base grease**



2. Install:
 - lower ring nut ①
 - rubber washer ②
 - upper ring nut ③
 - lock washer ④
 Refer to “CHECKING AND ADJUSTING THE STEERING HEAD” in chapter 3.

3. Install:
 • upper bracket
 • steering stem nut

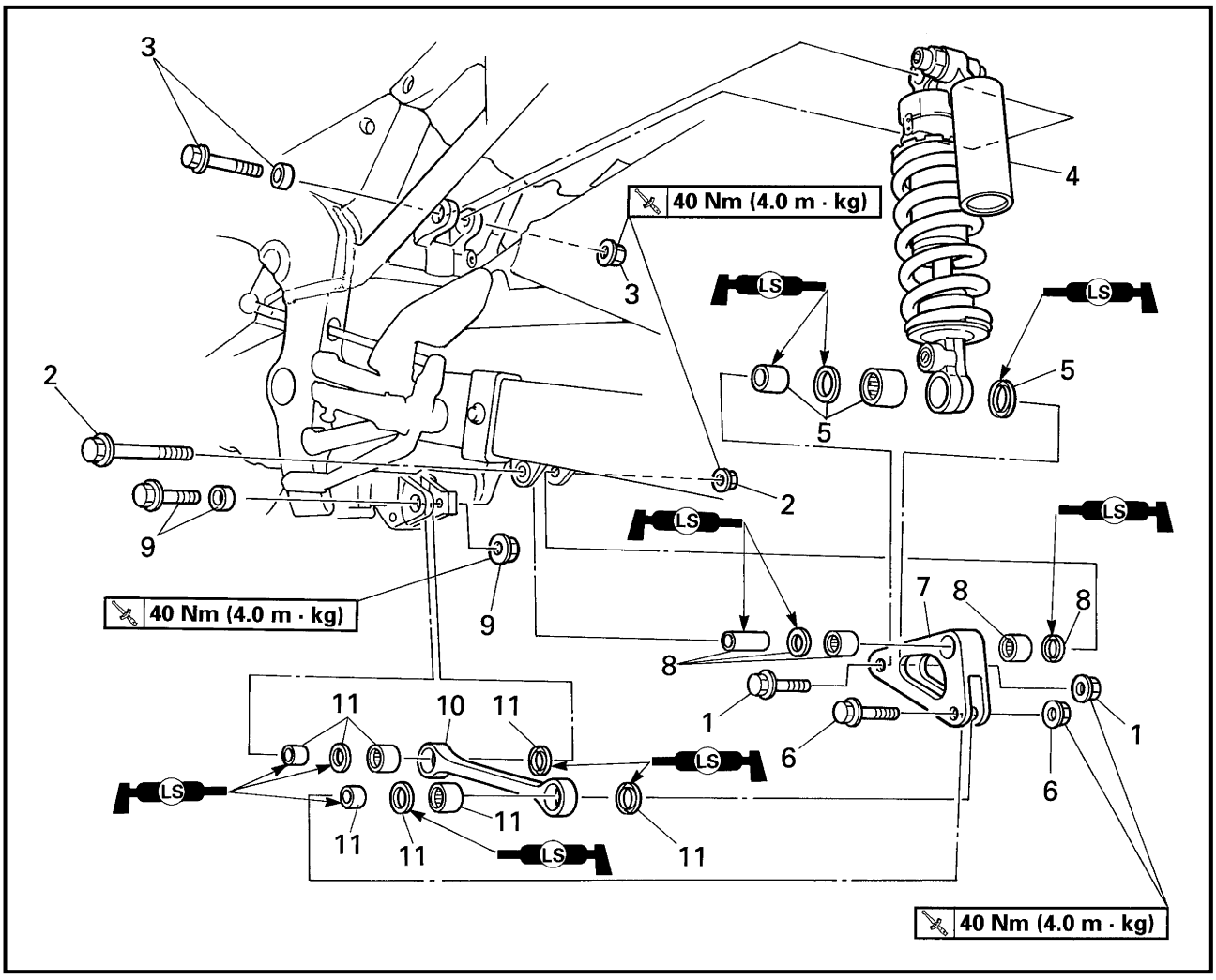
 NOTE:
 Temporarily tighten the steering stem nut.

4. Install:
 • front fork legs
 Refer to “FRONT FORK”.

 NOTE:
 Temporarily tighten the upper and lower bracket pinch bolts, and handlebar pinch bolts.

5. Tighten:
 • steering stem nut
 115 Nm (11.5 m · kg)
 • lower bracket pinch bolt
 23 Nm (2.3 m · kg)
 • upper bracket pinch bolt
 23 Nm (2.3 m · kg)
 • upper bracket bolt
 13 Nm (1.3 m · kg)
 • handlebar pinch bolt
 17 Nm (1.7 m · kg)

EB706000
REAR SHOCK ABSORBER ASSEMBLY



Order	Job/Part	Q'ty	Remarks
	Removing the rear shock absorber assembly		Remove the parts in the order listed.
1	Self-locking nut/bolt	1/1	Bolt ℓ = 54 mm
2	Self-locking nut/bolt	1/1	Bolt ℓ = 80 mm
3	Self-locking nut/bolt/spacer	1/1/1	Bolt ℓ = 65 mm
4	Rear shock absorber assembly	1	
5	Spacer/oil seal/bearing	1/2/1	
6	Self-locking nut/bolt	1/1	Bolt ℓ = 54 mm
7	Relay arm	1	
8	Spacer/oil seal/bearing	1/2/2	
9	Self-locking nut/bolt/spacer	1/1/1	Bolt ℓ = 65 mm
10	Connecting arm	1	
11	Spacer/oil seal/bearing	2/4/2	
			For installation, reverse the removal procedure.

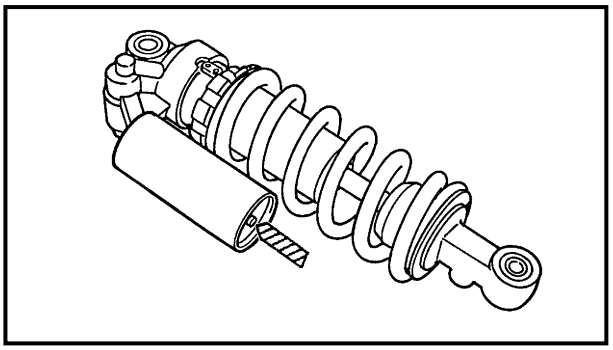
EB706101

HANDLING THE REAR SHOCK ABSORBER AND GAS CYLINDER

⚠ WARNING

This rear shock absorber and gas cylinder contain highly compressed nitrogen gas. Before handling the rear shock absorber or gas cylinder, read and make sure you understand the following information. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling of the rear shock absorber and gas cylinder.

- **Do not tamper or attempt to open the rear shock absorber or gas cylinder.**
- **Do not subject the rear shock absorber or gas cylinder to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.**
- **Do not deform or damage the rear shock absorber or gas cylinder in any way. If the rear shock absorber, gas cylinder or both are damaged, damping performance will suffer.**



EB706111

DISPOSING OF A REAR SHOCK ABSORBER AND GAS CYLINDER

Gas pressure must be released before disposing of a rear shock absorber and gas cylinder. To release the gas pressure, press on the gas valve needle with a suitable tool as shown, until all of the gas is released (the hissing has stopped).

⚠ WARNING

Wear eye protection to prevent eye damage from released gas or metal chips.

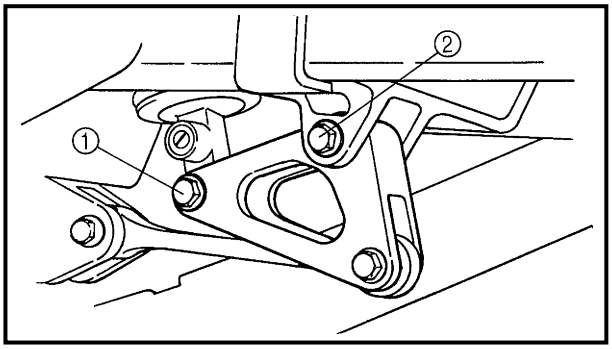
EB706204
REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the motorcycle on a level surface.

⚠ WARNING

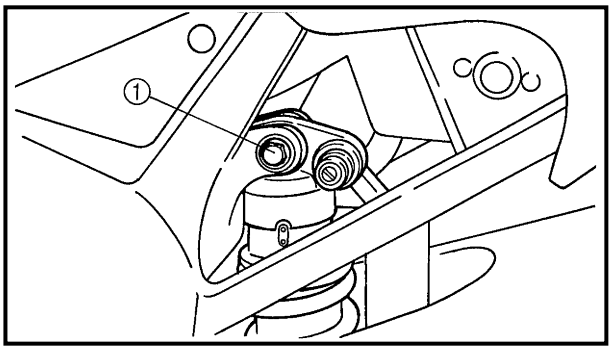
Securely support the motorcycle so that there is no danger of it falling over.

NOTE:
Place the motorcycle on a suitable stand so that the rear wheel is elevated.



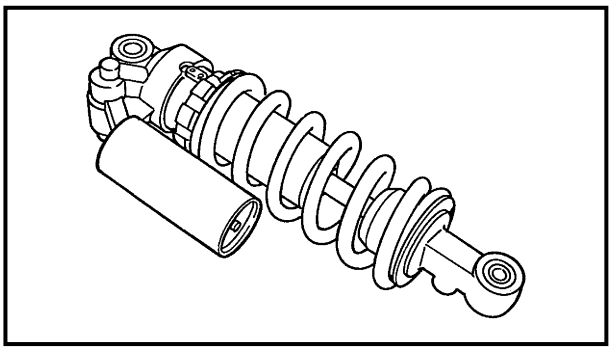
2. Remove:
 - rear shock absorber assembly lower bolt ①
 - relay-arm-to-swingarm bolt ②

NOTE:
While removing the rear shock absorber assembly lower bolt, hold the swingarm so that it does not drop down.



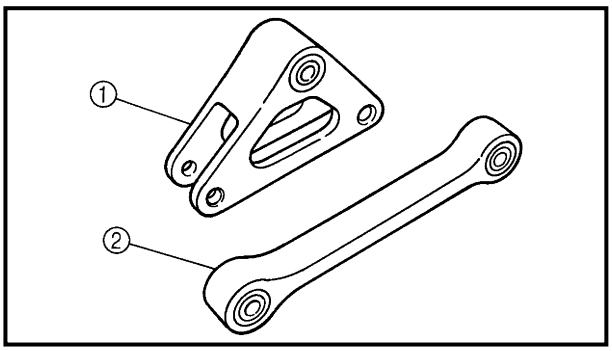
3. Remove:
 - rear shock absorber assembly upper bolt ①
 - rear shock absorber assembly

NOTE:
Raise the swingarm and then remove the rear shock absorber assembly from between the swingarm.



EB706401
CHECKING THE REAR SHOCK ABSORBER ASSEMBLY AND GAS CYLINDER

1. Check:
 - rear shock absorber rod
 Bends/damage → Replace the rear shock absorber assembly.
 - rear shock absorber
 Gas leaks/oil leaks → Replace the rear shock absorber assembly.
 - spring
 Damage/wear → Replace the rear shock absorber assembly.
 - gas cylinder
 Damage/gas leaks → Replace.
 - bushings
 Damage/wear → Replace.
 - dust seals
 Damage/wear → Replace.
 - bolts
 Bends/damage/wear → Replace.



CHECKING THE RELAY ARM AND CONNECTING ARM

1. Check:
 - relay arm ①
 - connecting arm ②
 Damage/wear → Replace.
 - bearings
 - oil seals
 Damage/pitting → Replace.
 - spacers
 Damage/scratches → Replace.

EB706701
INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

1. Lubricate:
 - bearings
 - oil seals
 - spacers

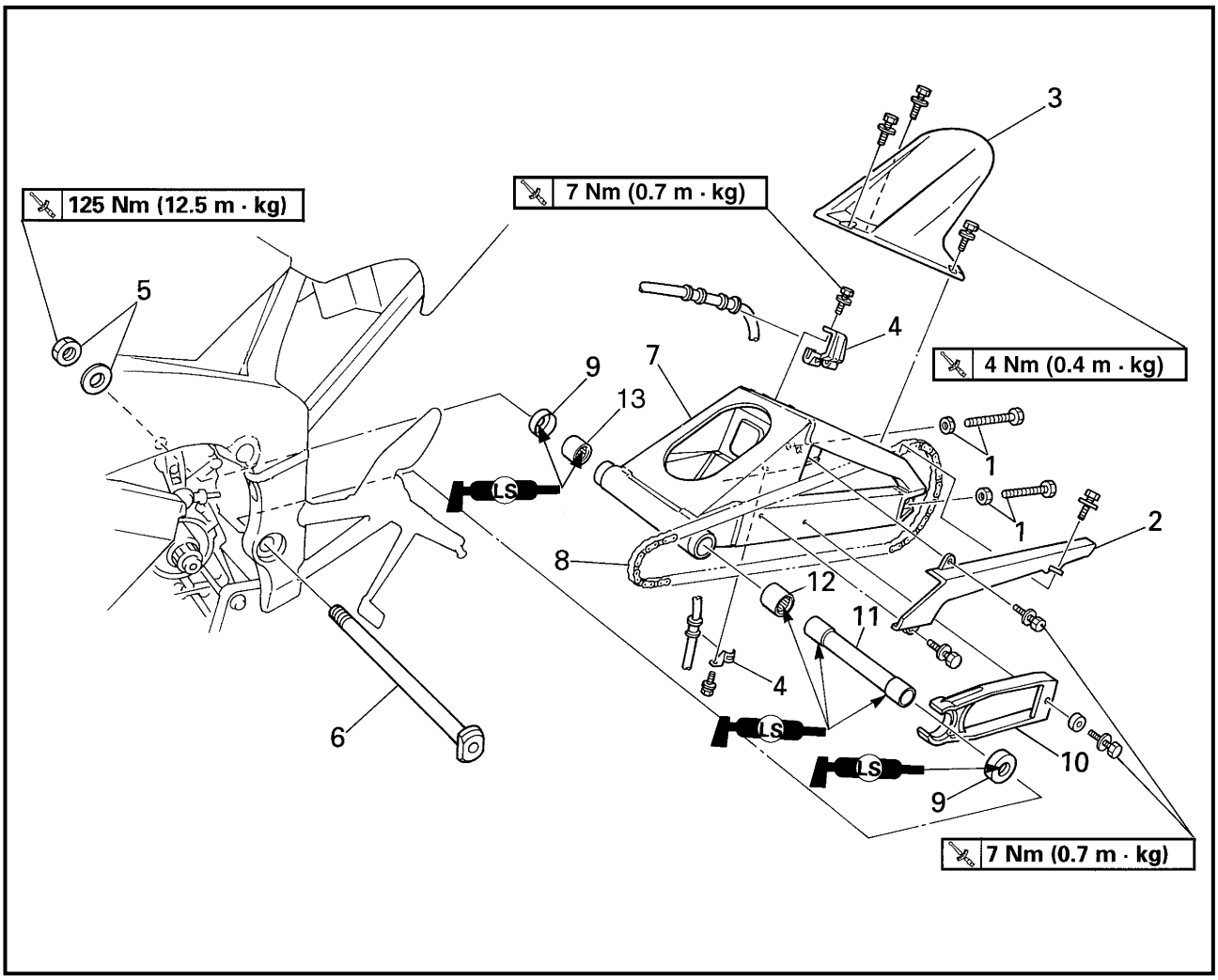
	Recommended lubricant **Lithium soap base grease**

2. Install:
 - connecting arm
 - relay arm
 - rear shock absorber assembly

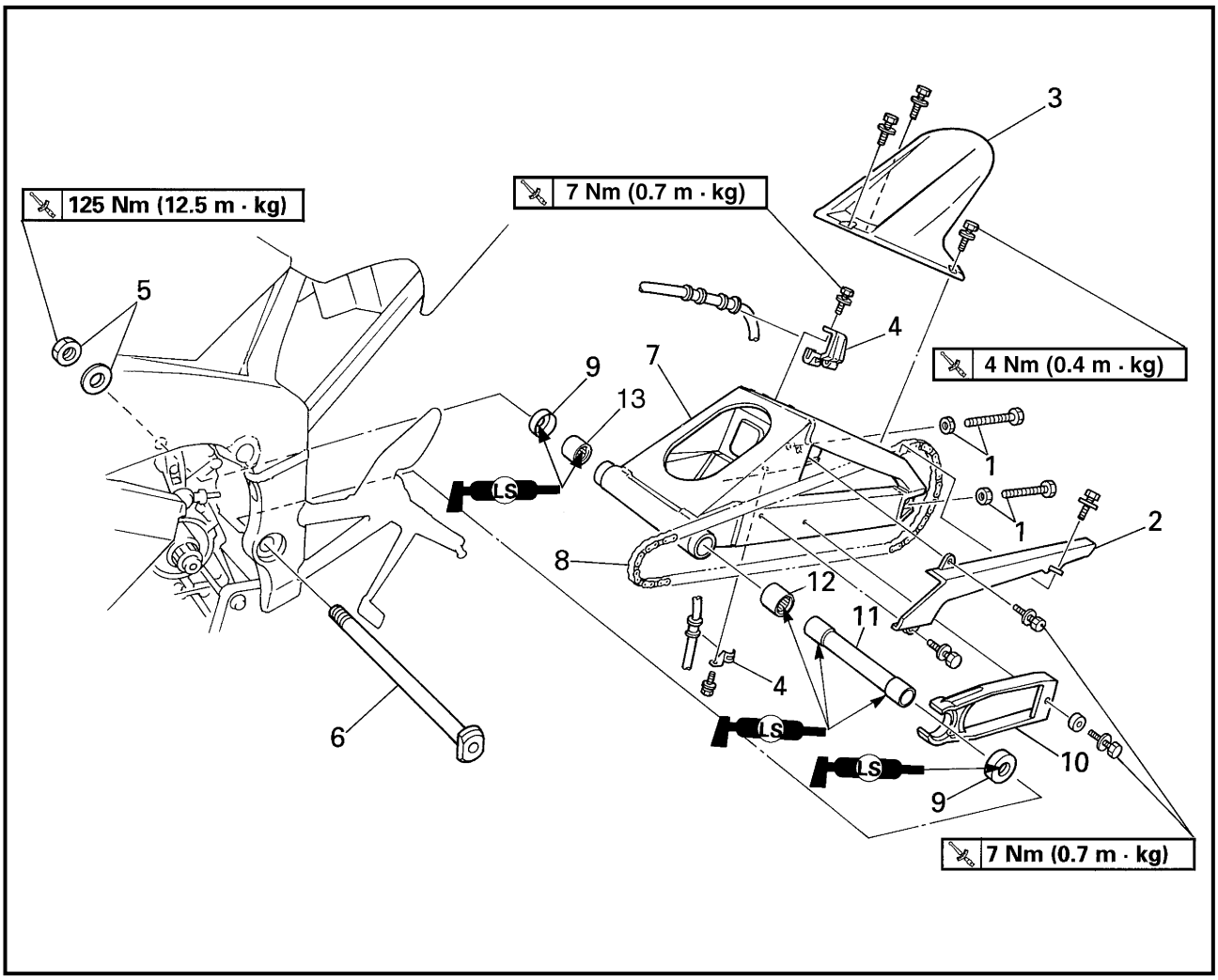
NOTE:
When installing the rear shock absorber assembly, lift up the swingarm.

3. Tighten:
 - connecting-arm-to-frame nut
 40 Nm (4.0 m · kg)
 - relay-arm-to-connecting-arm nut
 40 Nm (4.0 m · kg)
 - relay-arm-to-swingarm nut
 40 Nm (4.0 m · kg)
 - rear shock absorber assembly upper nut
 40 Nm (4.0 m · kg)
 - rear shock absorber assembly lower nut
 40 Nm (4.0 m · kg)

EB707000
SWINGARM AND DRIVE CHAIN



Order	Job/Part	Q'ty	Remarks
	Removing the swingarm and drive chain		Remove the parts in the order listed.
	Drive sprocket		Refer to "ENGINE" in chapter 4.
	Rear wheel		Refer to "REAR WHEEL, BRAKE DISC, AND REAR WHEEL SPROCKET".
	Rear shock absorber assembly		Refer to "REAR SHOCK ABSORBER ASSEMBLY".
1	Adjusting bolt/locknut	2/2	
2	Drive chain guard	1	
3	Rear fender	1	
4	Brake hose holder	2	
5	Pivot shaft nut/washer	1/1	
6	Pivot shaft	1	
7	Swingarm	1	



Order	Job/Part	Q'ty	Remarks
8	Drive chain	1	
9	Dust cover	2	
10	Drive chain guide	1	
11	Spacer	1	
12	Left bearing	1	
13	Right bearing	1	
			For installation, reverse the removal procedure.

EB707100

NOTE:
Before removing the drive sprocket, drive chain, and rear wheel, measure the drive chain slack and the length of a ten-link section of the drive chain.

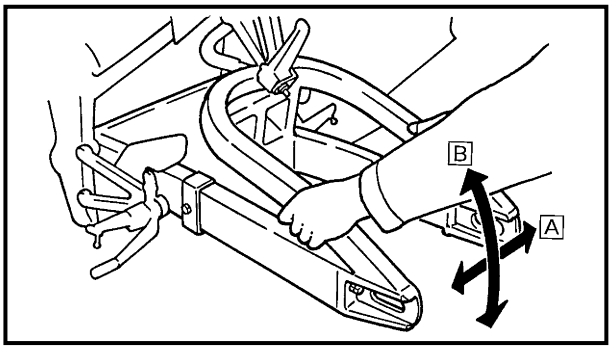
EB707111
REMOVING THE SWINGARM

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

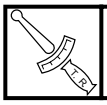
NOTE:
Place the motorcycle on a suitable stand so that the rear wheel is elevated.



2. Measure:
 - swingarm side play
 - swingarm vertical movement

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a. Measure the tightening torque of the pivot shaft nut.



Pivot shaft nut
125 Nm (12.5 m • kg)

b. Measure the swingarm side play A by moving the swingarm from side to side.

c. If the swingarm side play is out of specification, check the spacers, bearings, washers, and dust covers.



Swingarm side play (at the end of the swingarm)
1.0 mm

d. Check the swingarm vertical movement B by moving the swingarm up and down.

If swingarm vertical movement is not smooth or if there is binding, check the spacers, bearings, washers, and dust covers.

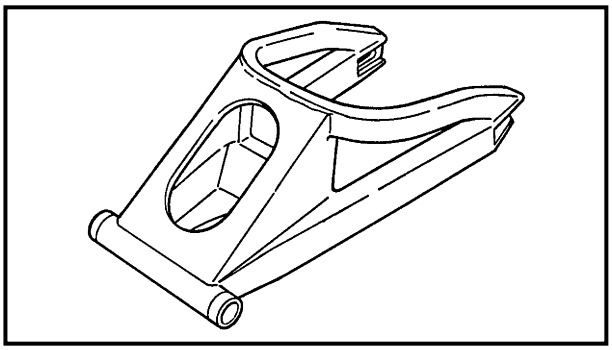
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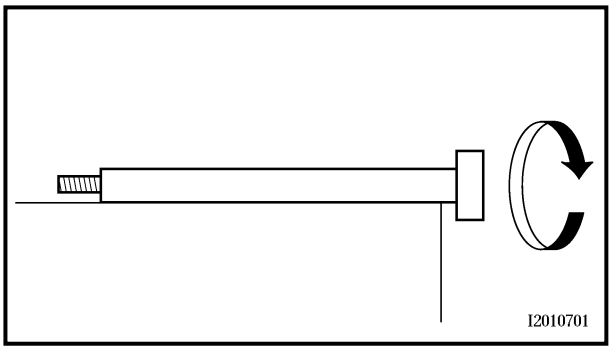
EB707120
REMOVING THE DRIVE CHAIN

1. Remove:
 • drive chain
 (with the drive chain cutter)

	Drive chain cutter **90890-01286**

NOTE:
Only cut the drive chain if it or the swingarm is to be replaced.





EB707400
CHECKING THE SWINGARM

1. Check:
 • swingarm
 Bends/cracks/damage → Replace.

NOTE:
If the swingarm must be replaced, the drive chain must be cut with a drive chain cutter.

2. Check:
 • pivot shaft
 Roll the pivot shaft on a flat surface.
 Bends → Replace.

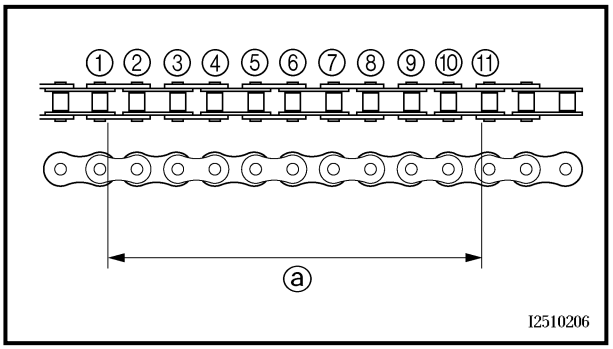
⚠ WARNING

Do not attempt to straighten a bent pivot shaft.

3. Wash:
 • pivot shaft
 • dust covers
 • spacer
 • bearings

	Recommended cleaning solvent **Kerosine**

4. Check:
 • dust covers
 • spacer
 • oil seals
 Damage/wear → Replace.
 • bearings
 Damage/pitting → Replace.

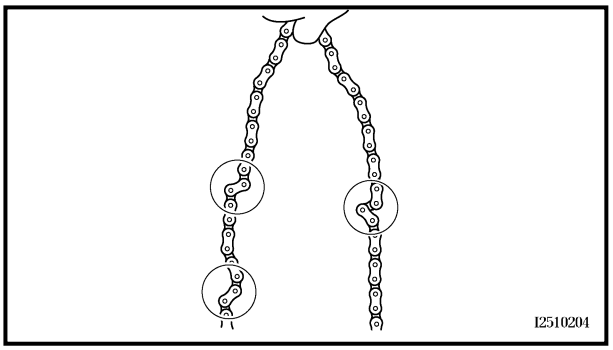


EB707410
CHECKING THE DRIVE CHAIN

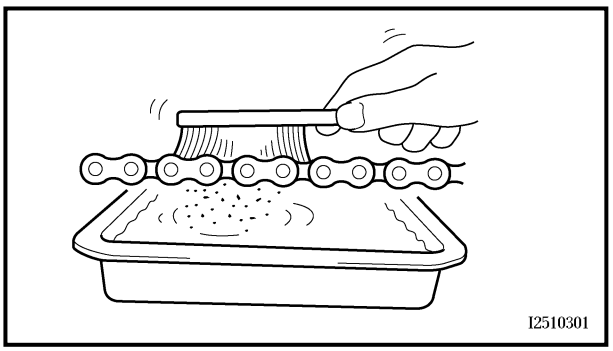
1. Measure:
 • ten-link section ⓐ of the drive chain
 Out of specification → Replace the drive chain.

Max. ten-link drive chain section
150.1 mm

NOTE:
- While measuring the ten-link section, push down on the drive chain to increase its tension.
- Measure the length between drive chain roller ① and ⑪ as shown.
- Perform this measurement at two or three different places.



2. Check:
 • drive chain
 Stiffness → Clean and lubricate or replace.

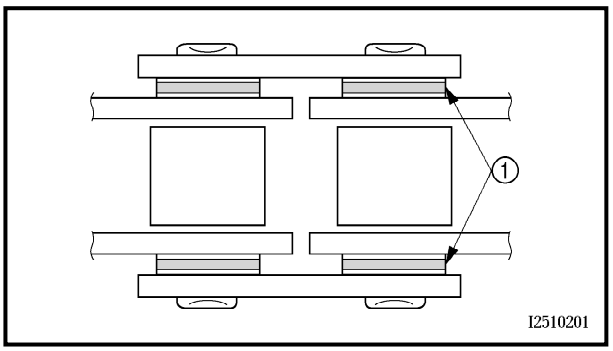


3. Clean:
 • drive chain

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Wipe the drive chain with a clean cloth.

b. Put the drive chain in kerosine and remove any remaining dirt.

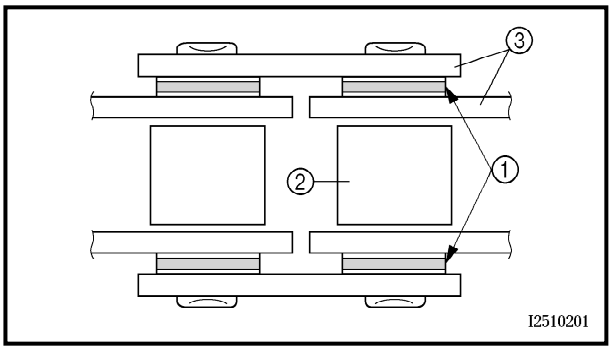


c. Remove the drive chain from the kerosine and completely dry it.

CAUTION:

This motorcycle has a drive chain with small rubber O-rings ① between the drive chain side plates. Never use high-pressure water or air, steam, gasoline, certain solvents (e.g., benzine), or a coarse brush to clean the drive chain. High-pressure methods could force dirt or water into the drive chain's internals, and solvents will deteriorate the O-rings. A coarse brush can also damage the O-rings. Therefore, use only kerosine to clean the drive chain.

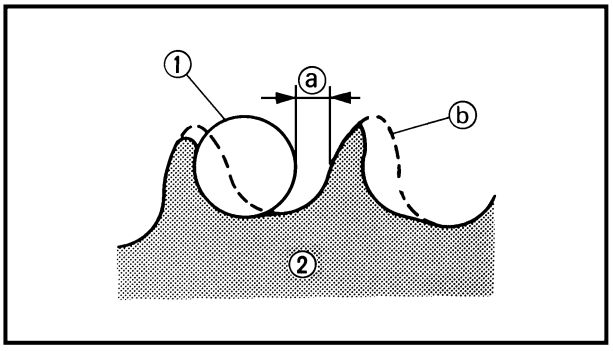
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4. Check:
 - O-rings ①
 Damage → Replace the drive chain.
 - drive chain rollers ②
 Damage/wear → Replace the drive chain.
 - drive chain side plates ③
 Cracks/damage/wear → Replace the drive chain.

5. Lubricate:
 - drive chain

Recommended lubricant
Engine oil or chain lubricant suitable for O-ring chains

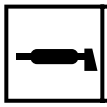


6. Check:
 - drive sprocket
 - rear wheel sprocket
 More than 1/4 tooth ⓐ wear → Replace the drive chain sprockets as a set.
 Bent teeth → Replace the drive chain sprockets as a set.

 ⓑ Correct
 ① Drive chain roller
 ② Drive chain sprocket

EB707700
INSTALLING THE SWINGARM

1. Lubricate:
 - bearings
 - spacers
 - dust covers
 - pivot shaft



Recommended lubricant
Lithium soap base grease

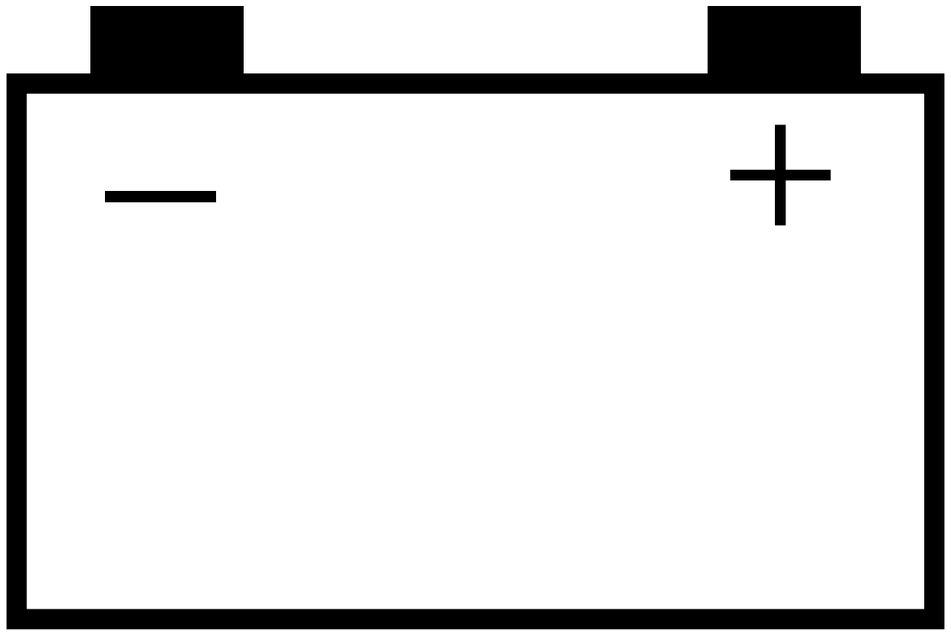
2. Install:
 - swingarm
 - pivot shaft
 - washer
 - pivot shaft nut **125 Nm (12.5 m · kg)**
3. Install:
 - rear shock absorber assembly
 - rear wheel

 Refer to "REAR SHOCK ABSORBER ASSEMBLY" and "REAR WHEEL".
4. Adjust:
 - drive chain slack

 Refer to "ADJUSTING THE DRIVE CHAIN SLACK" in chapter 3.



Drive chain slack
40 ~ 50 mm



ELEC 8

CHAPTER 8.
ELECTRICAL

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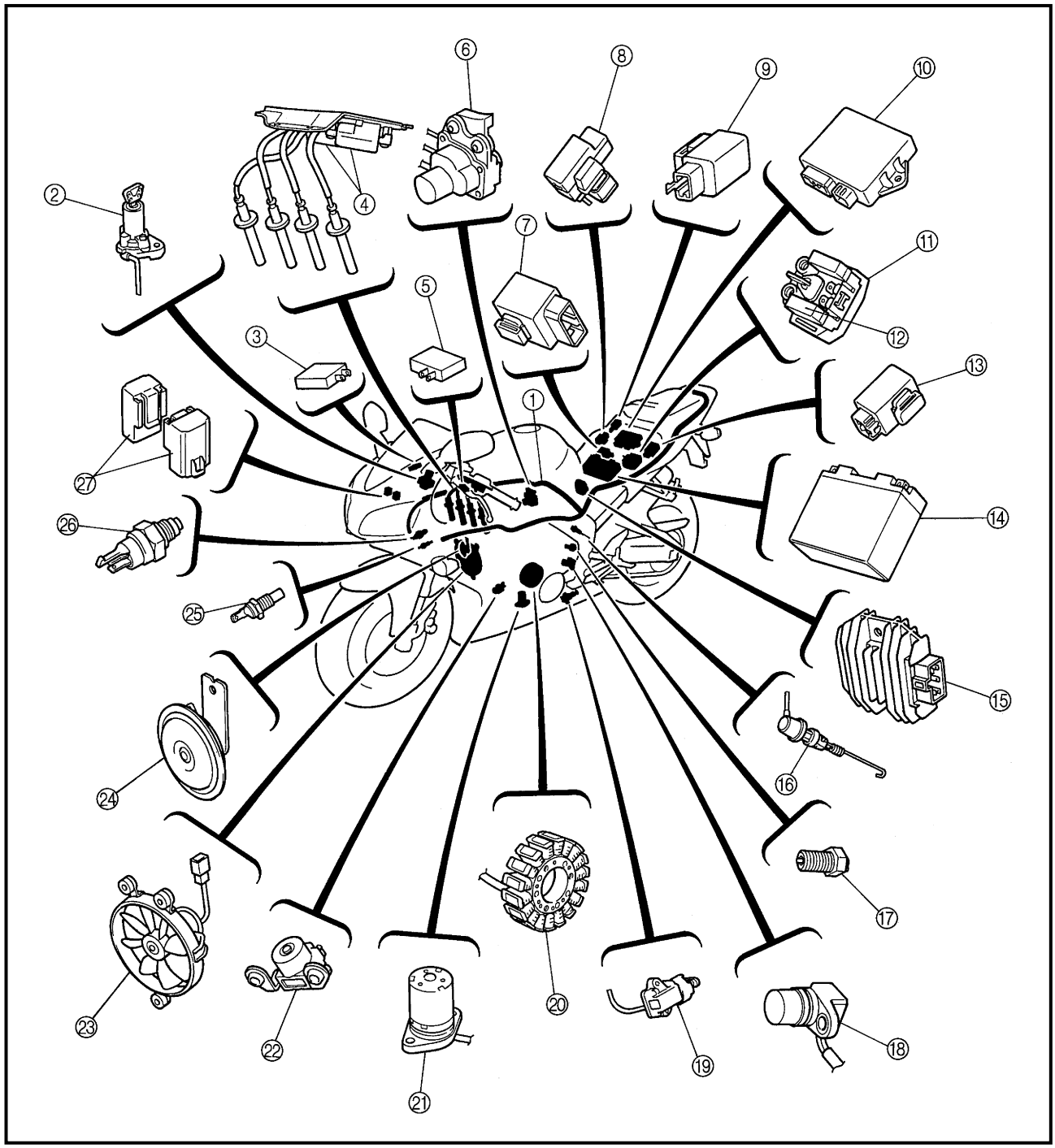
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EB800000

ELECTRICAL

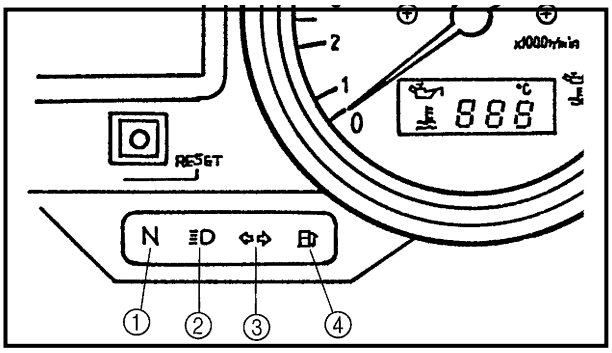
ELECTRICAL COMPONENTS

① Wire harness
② Main switch
③ Front brake light switch
④ Ignition coils
⑤ Clutch switch
⑥ EXUP servomotor
⑦ Relay unit
⑧ Fuse box
⑨ Turn signal relay
⑩ Ignitor unit
⑪ Starter relay
⑫ Main fuse
⑬ Oil level relay
⑭ Battery
⑮ Rectifier/regulator
⑯ Rear brake light switch
⑰ Neutral switch
⑱ Speed sensor
⑲ Sidestand switch
⑳ Stator coil assembly
㉑ Oil level switch
㉒ Pickup coil
㉓ Radiator fan
㉔ Horn
㉕ Temperature sender
㉖ Thermo switch
㉗ Headlight relay



INSTRUMENT FUNCTIONS

INDICATOR LIGHTS



① Neutral indicator light " N "
② High beam indicator light " ≣D "
③ Turn indicator light " ⇦⇨ "
④ Fuel indicator light " ⛽ "

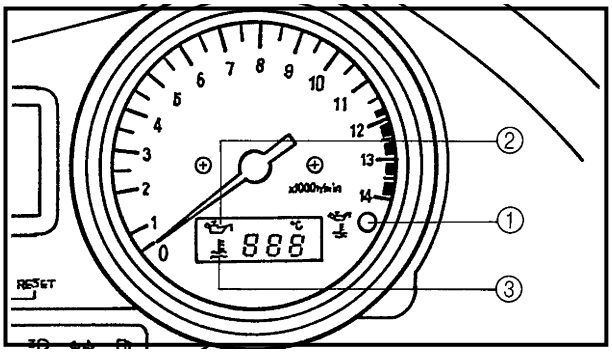
Turn indicator light " ⇦⇨ "
This indicator flashes when the turn switch is moved to the left or right.

Neutral indicator light " N "
This indicator comes on when the transmission is in neutral.

High beam indicator light " ≣D "
This indicator comes on when the headlight high beam is used.

Fuel indicator light " ⛽ "
When the fuel level drops below approximately 5.5 L, this light will come on. When this light comes on, fill the fuel tank at the first opportunity.

OIL LEVEL/COOLANT TEMPERATURE WARNING LIGHT



① Oil level/coolant temperature warning light " "
② Oil level symbol " "
③ Coolant temperature symbol " "

This warning light has two functions.

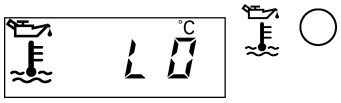
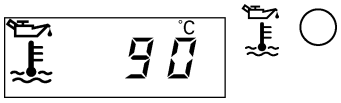
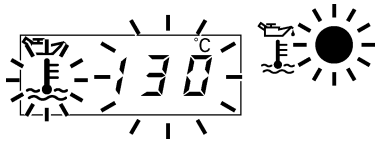
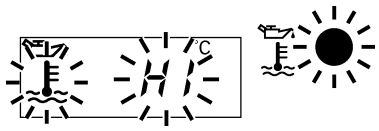
- The light will come on and symbol " " will flash if the engine oil level is low. If this symbol flashes, stop the engine immediately and fill it with oil to the specified level.
- The light will come on and symbol " " will flash if the coolant temperature is too high. The following chart shows the conditions of the indicator light, symbol and temperature display in accordance with the coolant temperature.

CAUTION:

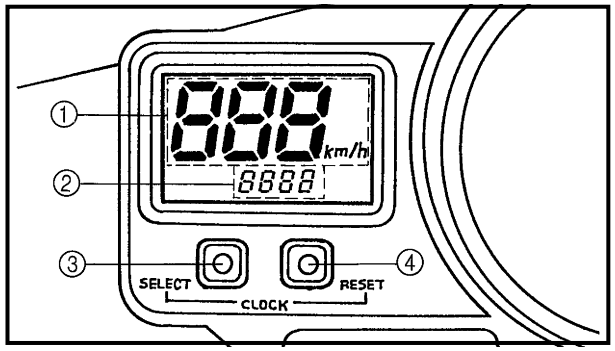
- **Do not run the motorcycle until you know it has sufficient engine oil.**
- **Do not run the motorcycle if the engine is overheated.**

NOTE:

Even if the oil is filled to the specified level, the warning light may flicker when riding on a slope or during sudden acceleration or deceleration, but this is normal.

Coolant temperature	Display	Conditions	What to do
0 ˚C ~ 40 ˚C		Symbol is on and "LO" is displayed.	Go ahead with riding.
41 ˚C ~ 117 ˚C		Symbol is on and temperature is displayed.	Go ahead with riding.
118 ˚C ~ 140 ˚C		Symbol and temperature flashes and indicator light comes on.	Stop the motorcycle and allow it to idle until the coolant temperature goes down. If the temperature does not go down, stop the engine. Refer to "OVERHEATING" in chapter 9.
141 ˚C ~		Symbol flashes, "HI" is displayed and flashes, and the indicator light comes on.	Stop the engine and allow it to cool. Refer to "OVERHEATING" in chapter 9.

COMBINATION METER



① Speedometer
② Clock, odometer
③ "SELECT" button
④ "RESET" button

This combination meter is equipped with the following.
- A speedometer
- An odometer
- Two trip odometers
- A fuel reserve tripmeter
- A clock

For GB and USA models only:
To change the speedometer display from kilometers to miles, press the "SELECT" button for at least two seconds.

Odometer and trip meters

Use the trip meters to estimate how far you can ride on a tank of fuel.
Use the fuel reserve trip meter to see the distance traveled from when the fuel level dropped to the reserve level.

Push the "SELECT" button to change between the odometer mode "ODO" and the trip odometer modes "TRIP 1" and "TRIP 2" in the following order:
"ODO" → "TRIP 1" → "TRIP 2" → "ODO"

When the fuel level indicator light comes on the odometer display will automatically change to the fuel reserve trip meter mode "TRIP F" and start counting the distance traveled from that point. Push the "SELECT" button to change between the fuel odometer, trip odometer and odometer modes in the following order:
"TRIP F" → "TRIP 1" → "TRIP 2" → "ODO" → "TRIP F"

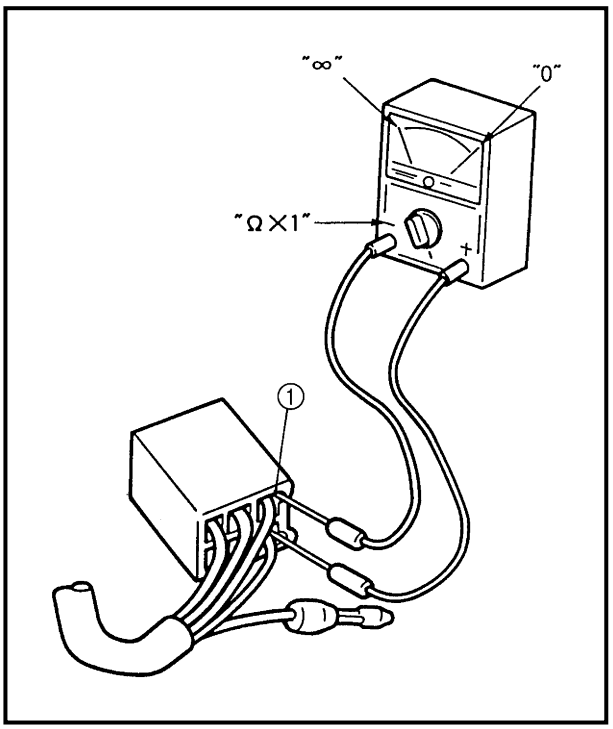
To reset a trip odometer to 0.0, select it by pushing the "SELECT" button and push the "RESET" button for at least one second. To reset the fuel reserve trip meter, select it by pushing the "SELECT" button and push the "RESET" button for at least one second. The display will return to "TRIP 1". If you do not reset the fuel reserve trip meter manually, it will automatically reset and return to "TRIP 1" after refueling and the motorcycle has traveled both 5 km and for approximately 3 minutes.

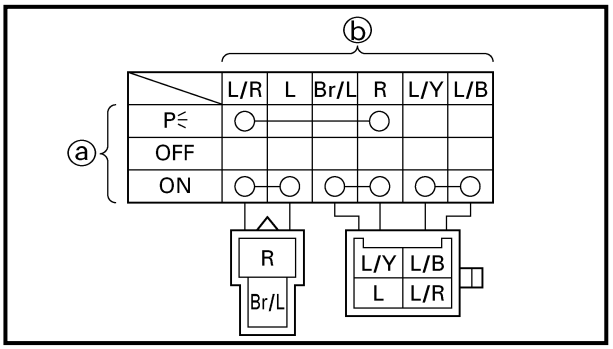
Clock

To change the display to the clock mode, push both the "SELECT" and "RESET" buttons.
To set the clock:

1. Push both the "SELECT" and "RESET" buttons for at least two seconds.
2. When the hour digits start flashing, push the "RESET" button to set the hours.
3. Push the "SELECT" button to change the minutes.
4. When the minute digits start flashing, push the "RESET" button to set the minutes.
5. Push the "SELECT" button to start the clock.

NOTE:
After setting the clock, be sure to push the "SELECT" button before turning the main switch to "OFF", otherwise the clock will not be set.





EB801000

SWITCHES

CHECKING SWITCH CONTINUITY

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

CAUTION:

Never insert the tester probes into the coupler terminal slots ①. Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.

	Pocket tester 90890-03112

NOTE:

- Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.
- When checking for continuity, switch back and forth between the switch positions a few times.

The terminal connections for switches (e.g., main switch, engine stop switch) are shown in an illustration similar to the one on the left.

The switch positions ⓐ are shown in the far left column and the switch lead colors ⓑ are shown in the top row in the switch illustration.

NOTE:

"○——○" indicates a continuity of electricity between switch terminals (i.e., a closed circuit at the respective switch position).

The example illustration on the left shows that:

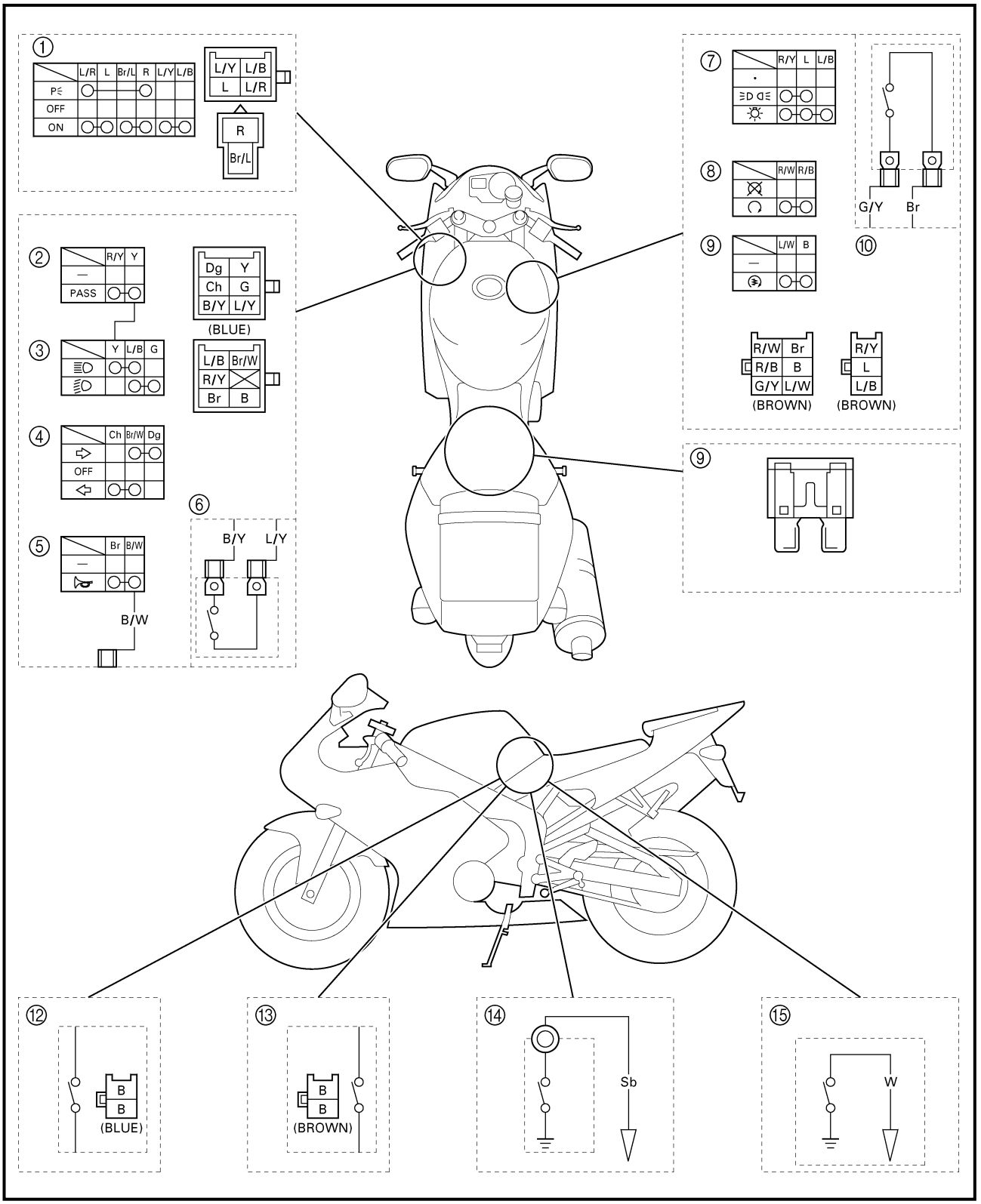
There is continuity between blue/red and red when the switch is set to " P≦ ".

There is continuity between blue/red and blue, between brown/blue and red, and between blue/yellow and blue/black when the switch is set to "ON".

EB801010
CHECKING THE SWITCHES

Check each switch for damage or wear, proper connections, and also for continuity between the terminals. Refer to “CHECKING SWITCH CONTINUITY”.

Damage/wear → Repair or replace the switch.
Improperly connected → Properly connect.
Incorrect continuity reading → Replace the switch.



① Main switch
② Pass switch
③ Dimmer switch
④ Turn signal switch
⑤ Horn switch
⑥ Clutch switch
⑦ Light switch
⑧ Engine stop switch
⑨ Start switch
⑩ Front brake light switch
⑪ Fuse
⑫ Sidestand switch
⑬ Rear brake light switch
⑭ Neutral switch
⑮ Oil level switch

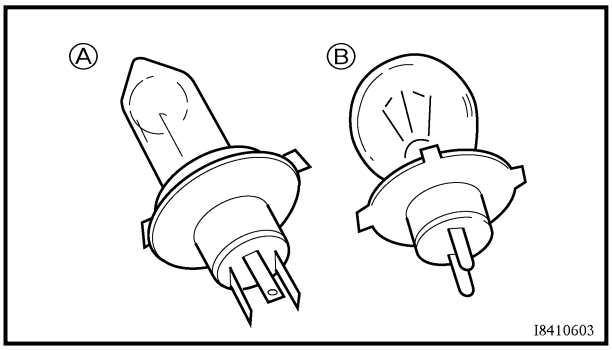
EB801020
CHECKING THE BULBS AND BULB SOCKETS

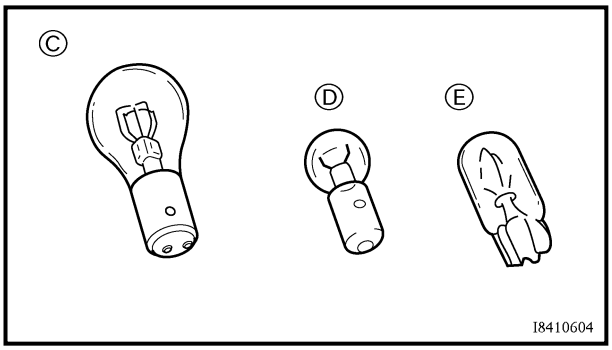
Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.

Damage/wear → Repair or replace the bulb, bulb socket or both.

Improperly connected → Properly connect.

Incorrect continuity reading → Repair or replace the bulb, bulb socket or both.





TYPES OF BULBS

The bulbs used on this motorcycle are shown in the illustration on the left.

- Bulbs Ⓐ and Ⓑ are used for headlights and usually use a bulb holder which must be detached before removing the bulb. The majority of these bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulb Ⓒ is used for turn signal and tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- Bulbs Ⓓ and Ⓔ are used for meter and indicator lights and can be removed from their respective socket by carefully pulling them out.

CHECKING THE CONDITION OF THE BULBS

The following procedure applies to all of the bulbs.

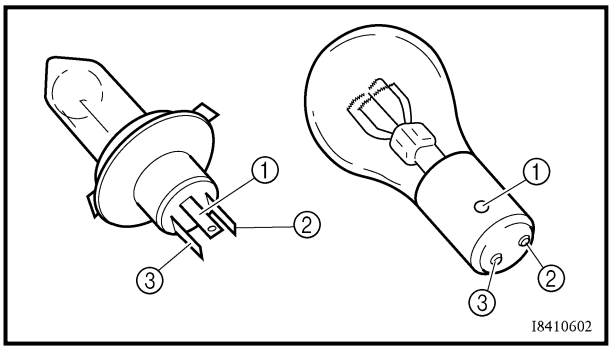
1. Remove:
 - bulb

⚠ WARNING

Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.

CAUTION:

- **Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.**
- **Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.**



2. Check:
 - bulb (for continuity)
 (with the pocket tester)
 No continuity → Replace.

	Pocket tester **90890-03112**

NOTE:
Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.

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a. Connect the tester positive probe to terminal ① and the tester negative probe to terminal ②, and check the continuity.

b. Connect the tester positive probe to terminal ① and the tester negative probe to terminal ③, and check the continuity.

c. If either of the readings indicate no continuity, replace the bulb.

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CHECKING THE CONDITION OF THE BULB SOCKETS

The following procedure applies to all of the bulb sockets.

1. Check:
 - bulb socket (for continuity) (with the pocket tester)
 No continuity → Replace.

	Pocket tester 90890-03112

NOTE:
Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

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a. Install a good bulb into the bulb socket.

b. Connect the pocket tester probes to the respective leads of the bulb socket.

c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲

CHECKING THE LEDs

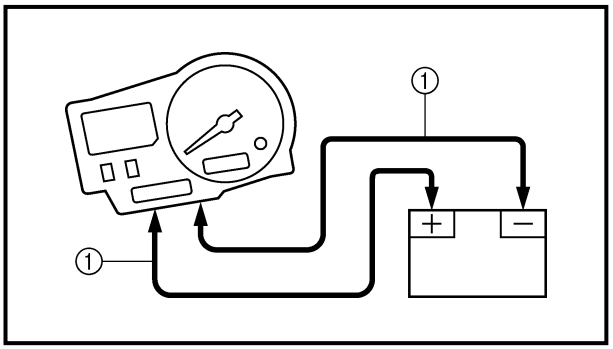
The following procedure applies to all of the LEDs.

1. Check:
 LED (for proper operation)

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a. Disconnect the meter assembly coupler (meter assembly side).

b. Connect two jumper leads ① from the battery terminals to the respective coupler terminals as shown.



⚠ WARNING

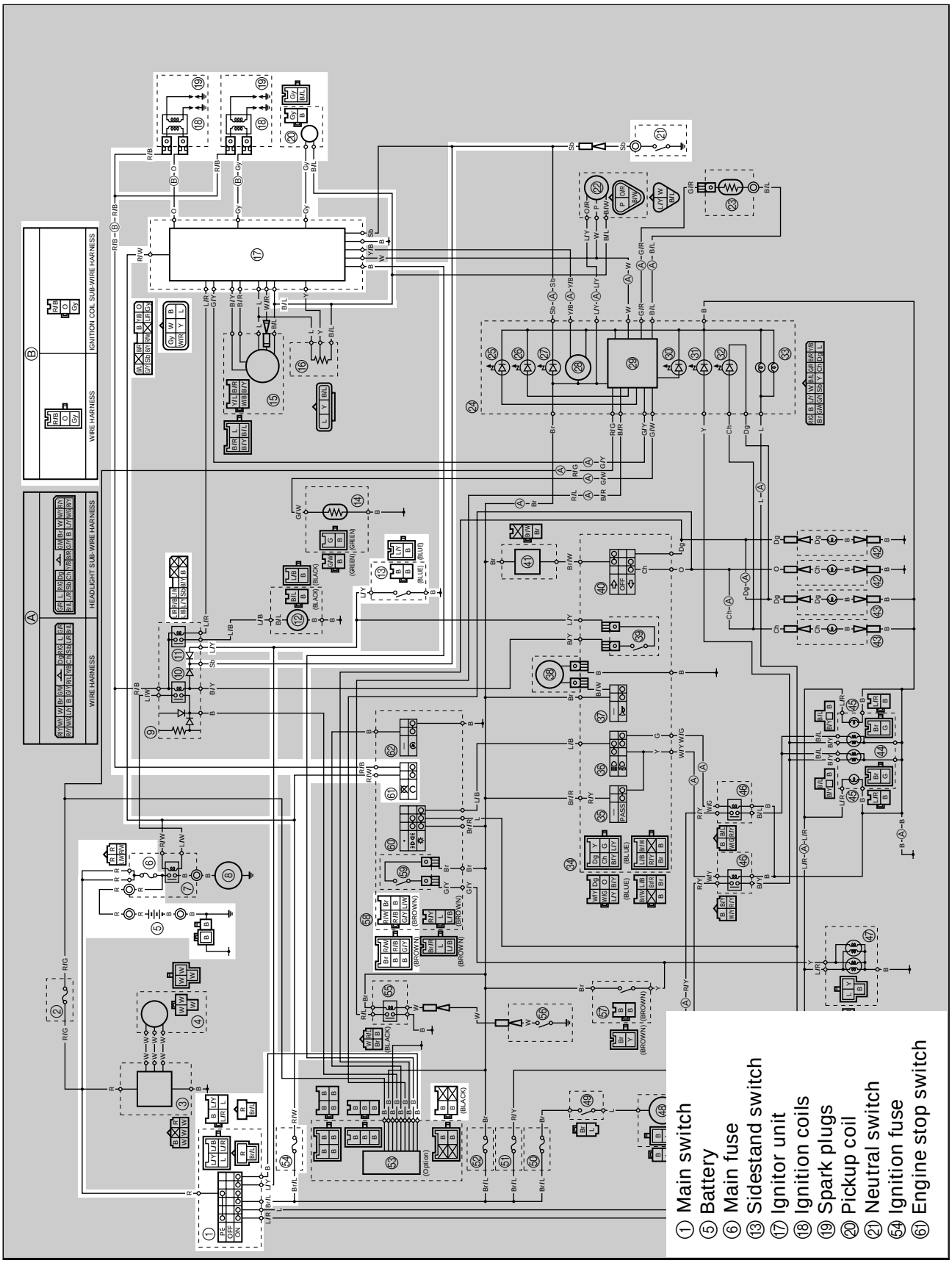
- **A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.**
- **This check is likely to produce sparks, therefore make sure that no flammable gas or fluid is in the vicinity.**

c. When the jumper leads are connected to the terminals the respective LED should illuminate.
 Does not light → Replace the meter assembly.

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EB802001
IGNITION SYSTEM

CIRCUIT DIAGRAM



EB802011
TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

Check:
1. main and ignition fuses
2. battery
3. spark plugs
4. ignition spark gap
5. spark plug cap resistance
6. ignition coil resistance
7. pickup coil resistance
8. main switch
9. engine stop switch
10. neutral switch
11. sidestand switch
12. relay unit
13. wiring
 (of the entire ignition system)

NOTE:
- Before troubleshooting, remove the following part(-s):

1) rider seat
2) fuel tank
3) air filter case
4) ignition coil plate and ignition coils
5) front cowling inner panel (left)
6) windshield

- Troubleshoot with the following special tool(-s).



Ignition checker
90890-06754
Pocket tester
90890-03112

EB802400

1.Main and ignition fuses

- Check the main and ignition fuses for continuity.
 Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main and ignition fuses OK?

YES

NO → Replace the fuse(-s).

EB802401

2.Battery

- Check the condition of the battery.
 Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Min. open-circuit voltage
12.8 V or more at 20 ˚C

- Is the battery OK?

YES

NO →
- Clean the battery terminals.
- Recharge or replace the battery.

EB802403

3.Spark plugs

The following procedure applies to all of the spark plugs.
- Check the condition of the spark plug.
- Check the spark plug type.
- Measure the spark plug gap.
 Refer to "CHECKING THE SPARK PLUGS" in chapter 3.



Standard spark plug
CR9E (NGK)
U27ESR-N (DENSO)
Spark plug gap
0.7 ~ 0.8 mm

- Is the spark plug in good condition, is it of the correct type, and its gap within specification?

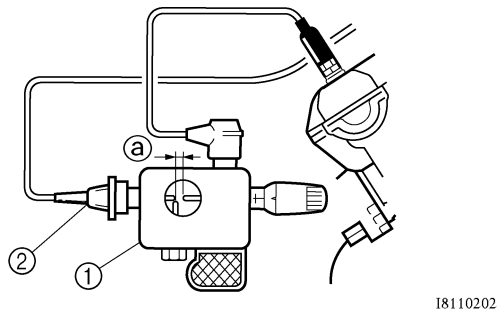
YES

NO → Re-gap or replace the spark plug.

EB802405

4.Ignition spark gap

The following procedure applies to all of the spark plugs.
- Disconnect the spark plug cap from the spark plug.
- Connect the ignition checker ① as shown.
- ②Spark plug cap
- Set the main switch to "ON".
- Measure the ignition spark gap ⓐ.
- Crank the engine by pushing the start switch and gradually increase the spark gap until a misfire occurs.



Min. ignition spark gap
6 mm

- Is there a spark and is the spark gap within specification?

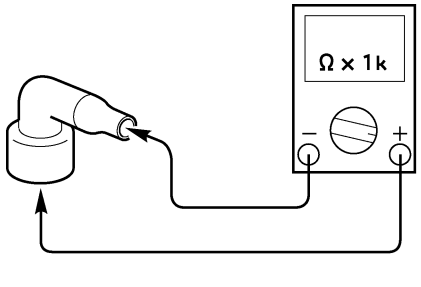
NO → The ignition system is OK.

YES

EB802407

5.Spark plug cap resistance

The following procedure applies to all of the spark plug caps.
- Disconnect the spark plug cap from the spark plug.
- Connect the pocket tester (Ω × 1k) to the spark plug cap as shown.
- Measure the spark plug cap resistance.



Spark plug cap resistance
10 kΩ at 20 ˚C

- Is the spark plug cap OK?

YES

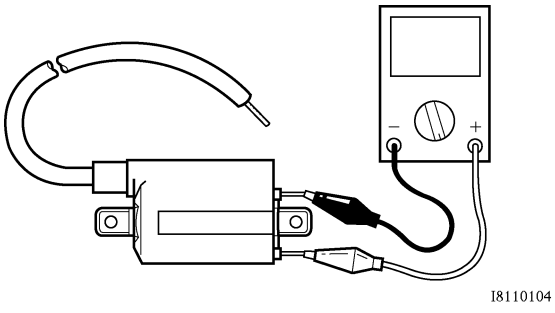
NO → Replace the spark plug cap.

EB802409

6.Ignition coil resistance

The following procedure applies to all of the ignition coils.
- Disconnect the ignition coil connectors from the ignition coil terminals.
- Connect the pocket tester (Ω × 1) to the ignition coil as shown.

Tester positive probe → red/black
Tester negative probe → orange (gray)

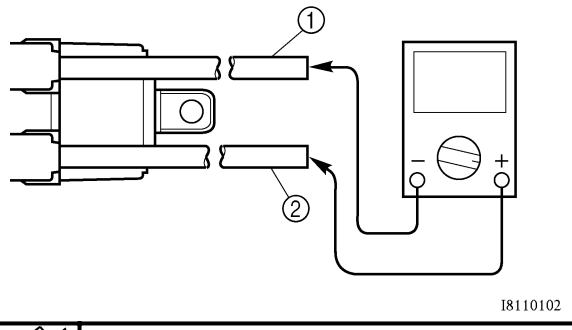


- Measure the primary coil resistance.

Primary coil resistance
1.87 ~ 2.53 Ω at 20 ˚C

- Connect the pocket tester (Ω × 1k) to the ignition coil as shown.
- Measure the secondary coil resistance.

Tester positive probe →
spark plug lead ①
Tester positive probe →
spark plug lead ②



Secondary coil resistance
12 ~ 18 kΩ at 20 ˚C

• Is the ignition coil OK?

YES

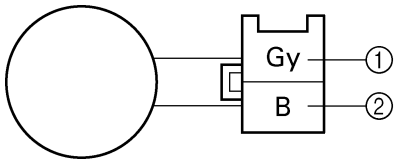
NO → Replace the ignition coil.

EB802410

7.Pickup coil resistance

• Disconnect the pickup coil coupler from the wire harness.
• Connect the pocket tester (Ω × 100) to the pickup coil terminal.

Tester positive probe → gray ①
Tester negative probe → black ②



• Measure the pickup coil resistance.

Pickup coil resistance
248 ~ 372 Ω at 20 ˚C
(between gray and black)

• Is the pickup coil OK?

YES

NO → Replace the pickup coil.

EB802411

8.Main switch

• Check the main switch for continuity. Refer to "CHECKING THE SWITCHES".
• Is the main switch OK?

YES

NO → Replace the main switch.

EB802412

9.Engine stop switch

• Check the engine stop switch for continuity. Refer to "CHECKING THE SWITCHES".
• Is the engine stop switch OK?

YES

NO → Replace the right handlebar switch.

EB802413

10.Neutral switch

• Check the neutral switch for continuity. Refer to "CHECKING THE SWITCHES".
• Is the neutral switch OK?

YES

NO → Replace the neutral switch.

EB802414

11.Sidestand switch

• Check the sidestand switch for continuity. Refer to "CHECKING THE SWITCHES".
• Is the sidestand switch OK?

YES

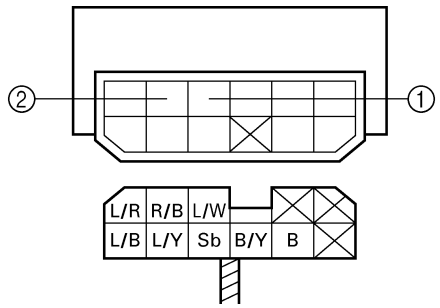
NO → Replace the sidestand switch.

EB802415

12.Relay unit

- Remove the relay unit from the wire harness.
- Connect the pocket tester (Ω × 1) to the relay unit terminals as shown.
- Check the starting circuit cutoff relay for continuity.

Tester positive probe → sky blue ① Tester negative probe → blue/yellow ②	**Continuity**
Tester positive probe → blue/yellow ② Tester negative probe → sky blue ①	**No continuity**



NOTE:
When you switch the tester's positive and negative probes, the readings in the above chart will be reversed.

- Are the tester readings correct?

YES → NO

Replace the relay unit.

EB802416

13.Wiring

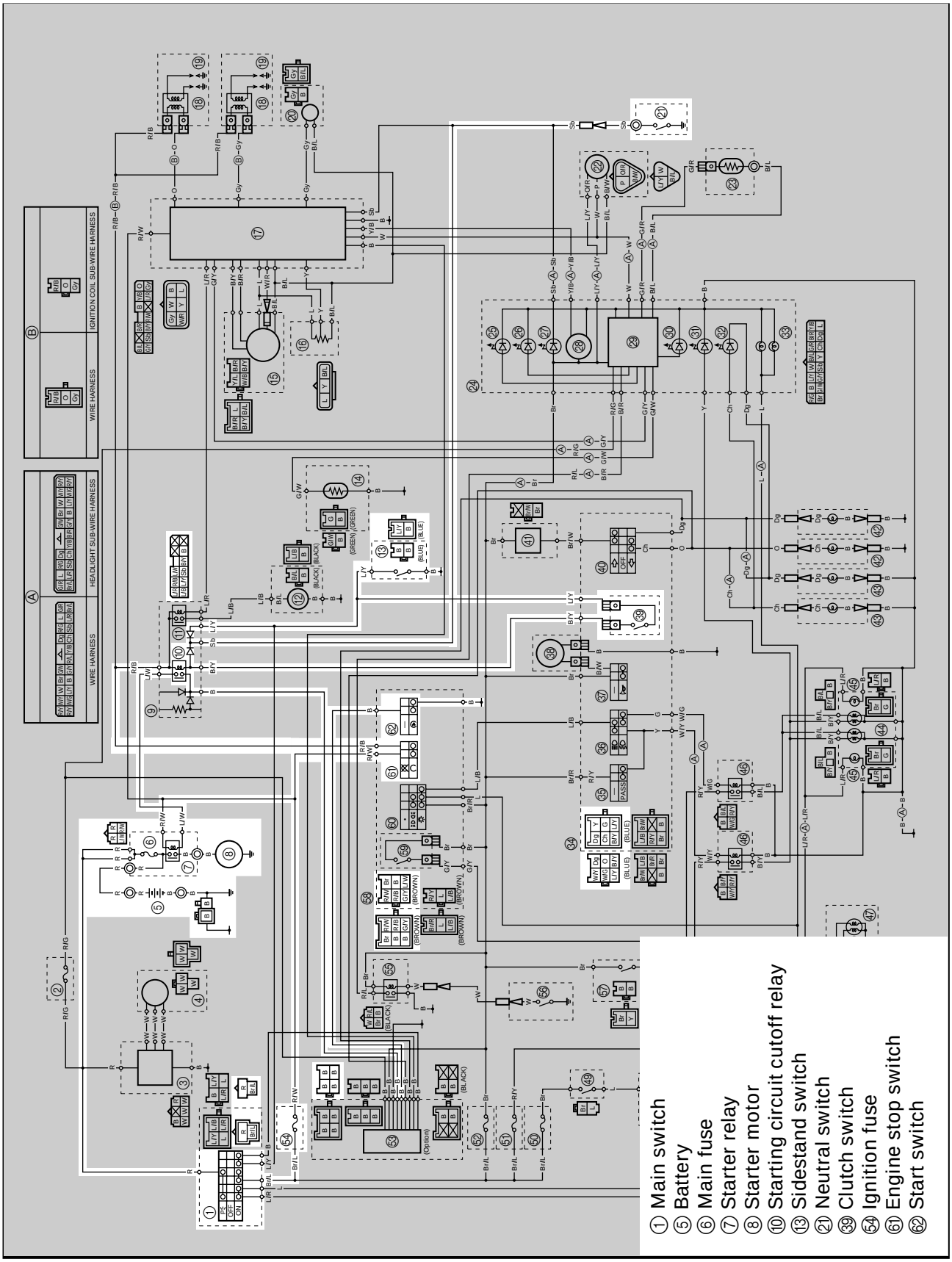
- Check the entire ignition system's wiring.
 Refer to "CIRCUIT DIAGRAM".
- Is the ignition system's wiring properly connected and without defects?

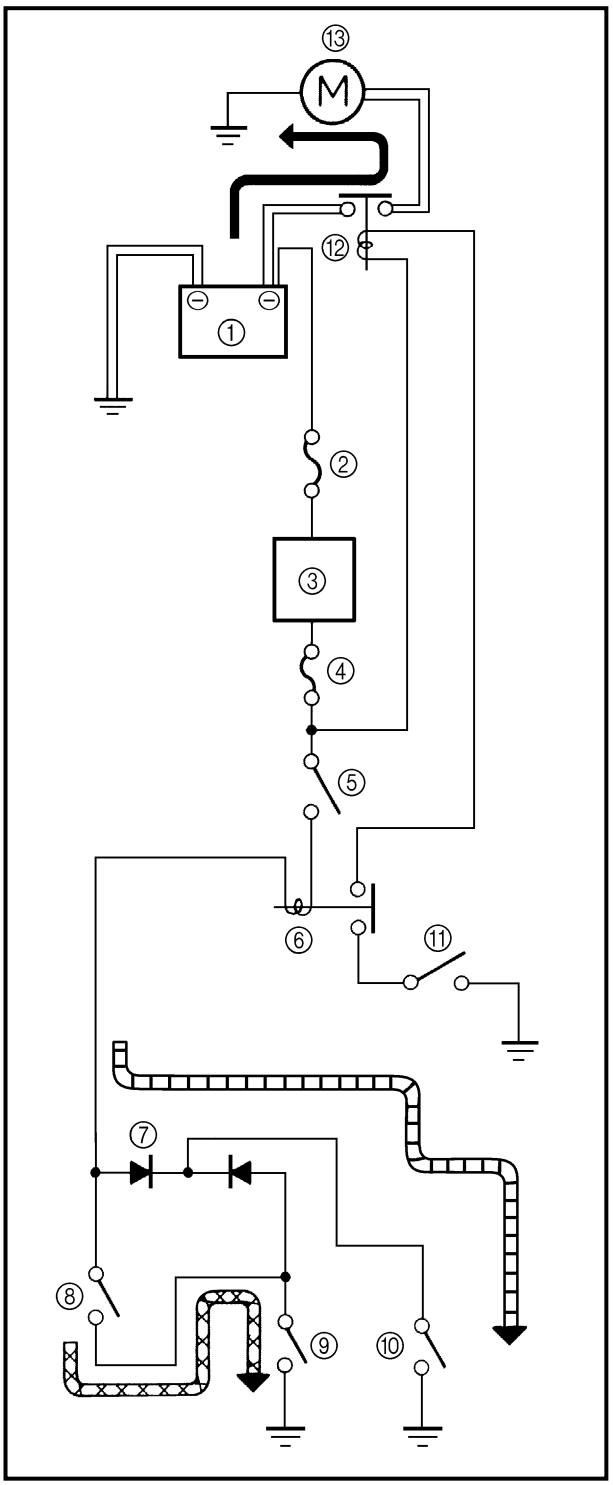
NO → Properly connect or repair the ignition system's wiring.

YES → Replace the ignitor unit.

EB803000
ELECTRIC STARTING SYSTEM

CIRCUIT DIAGRAM





EB803010

STARTING CIRCUIT CUTOFF SYSTEM

OPERATION

If the engine stop switch is set to "○" and the main switch is set to "ON" (both switches are closed), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral switch is closed).
- The clutch lever is pulled to the handlebar (the clutch switch is closed) and the sidestand is up (the sidestand switch is closed).

The starting circuit cutoff relay prevents the starter motor from operating when neither of these conditions has been met. In this instance, the starting circuit cutoff relay is open so current cannot reach the starter motor. When at least one of the above conditions has been met the starting circuit cutoff relay is closed and the engine can be started by pressing the start switch.

WHEN THE TRANSMISSION IS IN NEUTRAL

WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS PULLED TO THE HANDLEBAR

① Battery
② Main fuse
③ Main switch
④ Ignition fuse
⑤ Engine stop switch
⑥ Starting circuit cutoff relay
⑦ Diode
⑧ Clutch switch
⑨ Sidestand switch
⑩ Neutral switch
⑪ Start switch
⑫ Starter relay
⑬ Starter motor

EB803020
TROUBLESHOOTING

The starter motor fails to turn.

Check:
1. main and ignition fuses
2. battery
3. starter motor
4. starting circuit cutoff relay
5. relay unit
6. starter relay
7. main switch
8. engine stop switch
9. neutral switch
10. sidestand switch
11. clutch switch
12. start switch
13. wiring
(of the entire starting system)

NOTE:
- Before troubleshooting, remove the following part(-s):
1) rider seat
2) fuel tank
3) air filter case
4) front cowling inner panel (left)
5) windshield
- Troubleshoot with the following special tool(-s).



Pocket tester
90890-03112

EB802400
1.Main and ignition fuses

- Check the main and ignition fuses for continuity.
Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main and ignition fuses OK?

YES

NO

Replace the fuse(-s).

EB802401
2.Battery

- Check the condition of the battery.
Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Open-circuit voltage
12.8 V or more at 20 ˚C

- Is the battery OK?

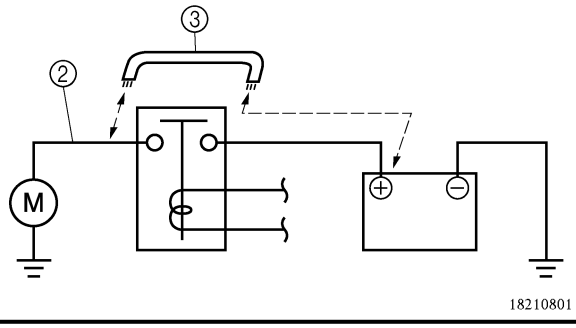
YES

NO

- Clean the battery terminals.
- Recharge or replace the battery.

EB803400
3.Starter motor

- Connect the battery positive terminal ① and starter motor lead ② with a jumper lead ③.



⚠ WARNING
- **A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.**
- **This check is likely to produce sparks, therefore make sure that no flammable gas or fluid is in the vicinity.**

- Does the starter motor turn?

YES

NO

Repair or replace the starter motor.

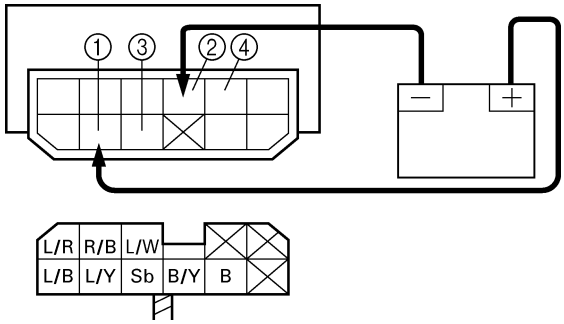
EB803402

4.Starting circuit cutoff relay

- Disconnect the relay unit from the coupler.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the relay unit terminals as shown.

Battery positive terminal → **red/black** ①
Battery negative terminal → **black/yellow** ②

Tester positive probe → **blue/white** ③
Tester negative probe → **black** ④



- Does the starting circuit cutoff relay have continuity between black and blue/white?

YES → Replace the relay unit.

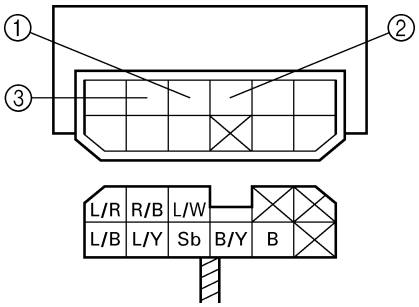
NO

EB803403

5.Relay unit

- Disconnect the relay unit from the coupler.
- Connect the pocket tester (Ω × 1) to the relay unit terminals as shown.
- Measure the starting circuit cutoff relay for continuity as follows.

Tester positive probe → **sky blue** ① **Tester negative probe** → **black/yellow** ②	**Continuity**
Tester positive probe → **sky blue** ① **Tester negative probe** → **blue/yellow** ③	**Continuity**
Tester positive probe → **black/yellow** ② **Tester negative probe** → **sky blue** ①	**No continuity**
Tester positive probe → **blue/yellow** ③ **Tester negative probe** → **sky blue** ①	**No continuity**



NOTE:
When you switch the tester's positive and negative probes, the readings in the above chart will be reversed.

- Are the tester readings correct?

YES → Replace the relay unit.

NO

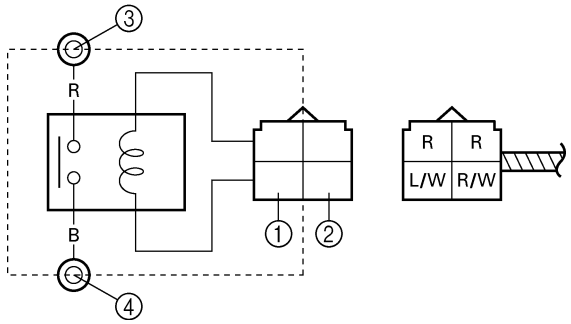
EB803404

6.Starter relay

- Disconnect the starter relay from the coupler.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the starter relay coupler as shown.

Battery positive terminal → **red/white** ①
Battery negative terminal → **blue/white** ②

Tester positive probe → **red** ③
Tester negative probe → **black** ④



- Does the starter relay have continuity between red and black?

YES → NO

Replace the starter relay.

EB802411

7.Main switch

- Check the main switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

YES → NO

Replace the main switch.

EB802412

8.Engine stop switch

- Check the engine stop switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the engine stop switch OK?

YES → NO

Replace the right handlebar switch.

EB802413

9.Neutral switch

- Check the neutral switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the neutral switch OK?

YES → NO

Replace the neutral switch.

EB802414

10.Sidestand switch

- Check the sidestand switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the sidestand switch OK?

YES → NO

Replace the sidestand switch.

EB803405

11.Clutch switch

- Check the clutch switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the clutch switch OK?

YES → NO

Replace the clutch switch.

EB803406

12.Start switch

- Check the start switch for continuity.
 Refer to "CHECKING THE SWITCHES".
- Is the start switch OK?

YES

NO

Replace the right handlebar switch.

EB803408

13.Wiring

- Check the entire starting system's wiring.
 Refer to "CIRCUIT DIAGRAM".
- Is the starting system's wiring properly connected and without defects?

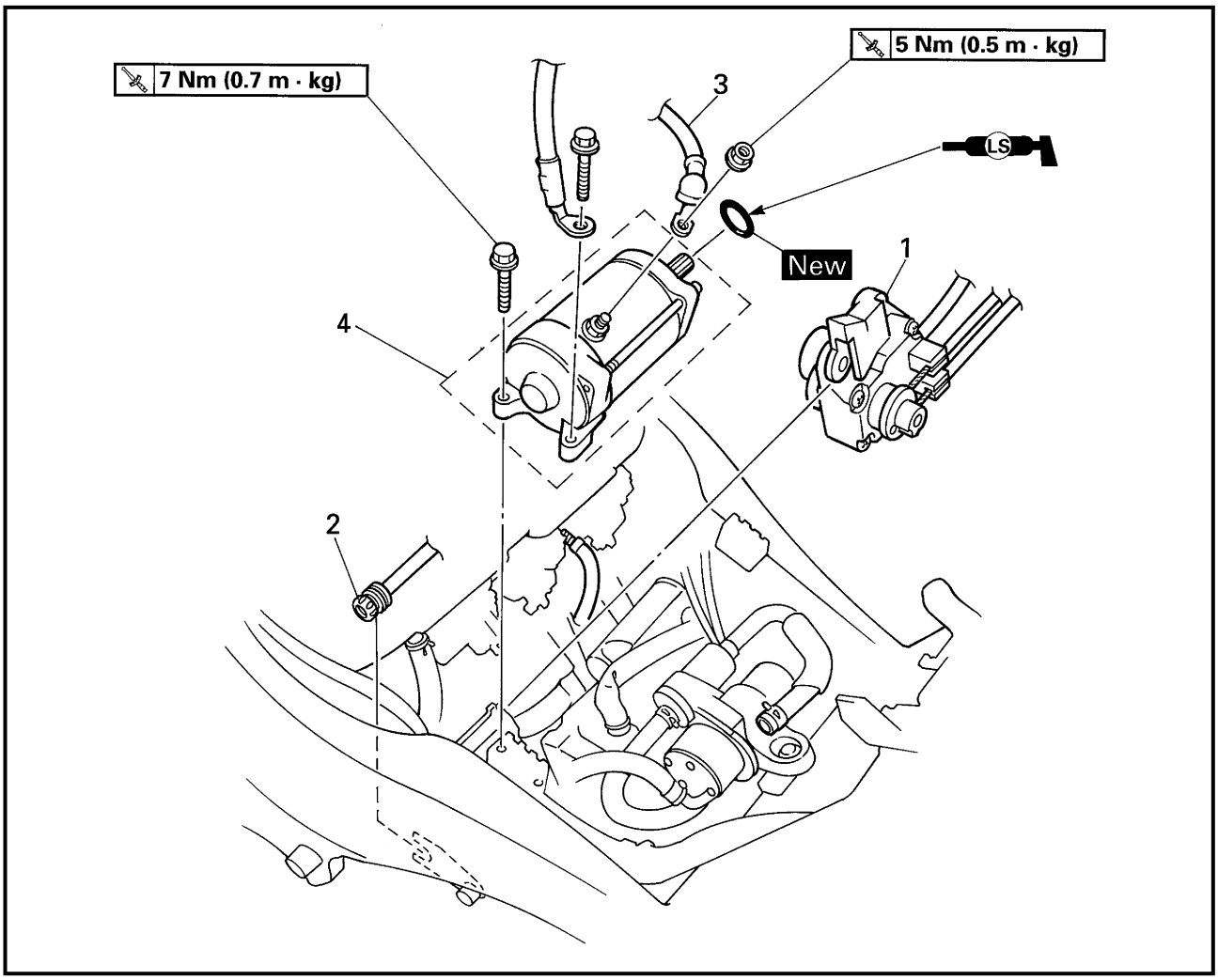
NO

YES

Properly connect or repair the starting system's wiring.

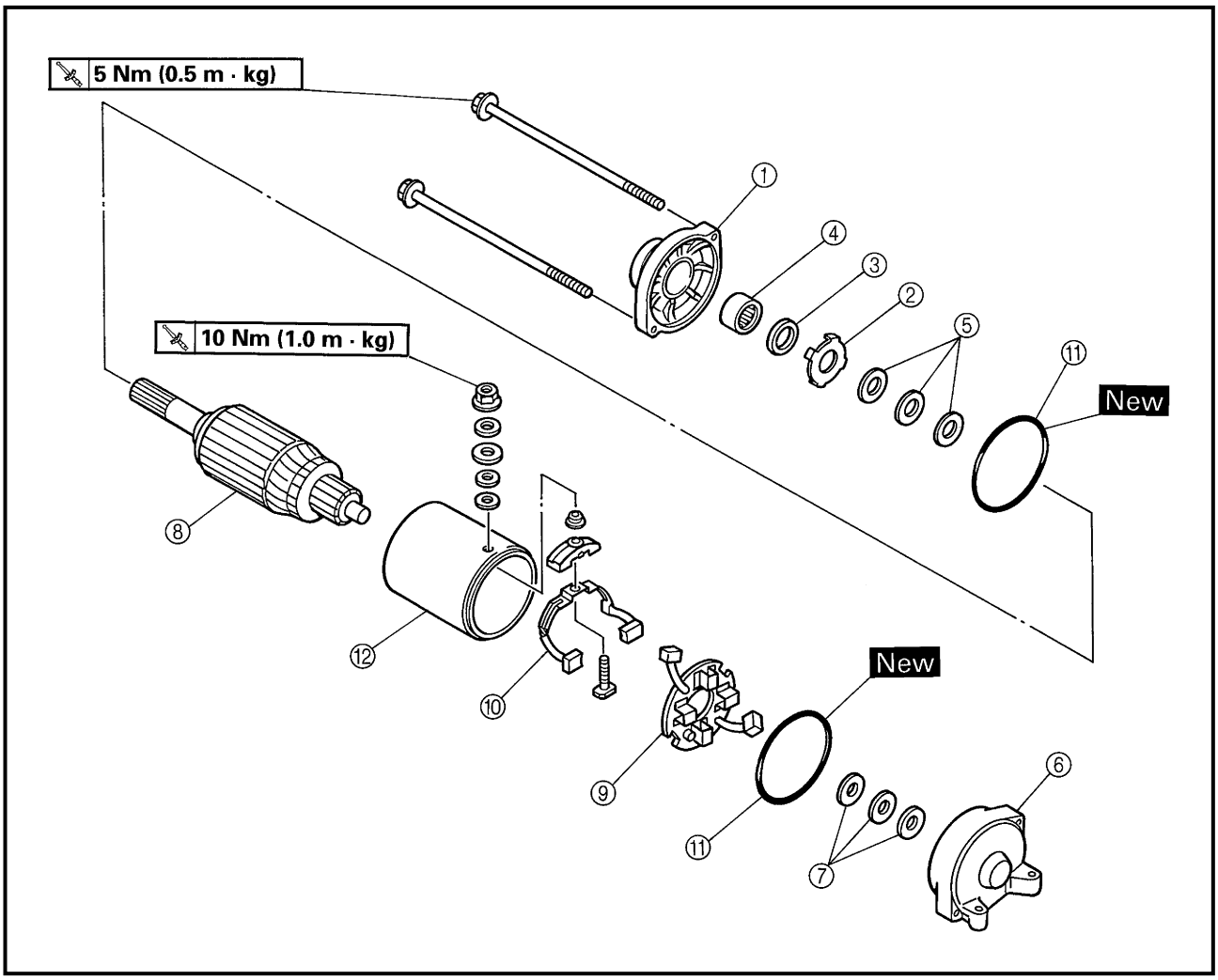
The starting system circuit is OK.

EB803500
STARTER MOTOR

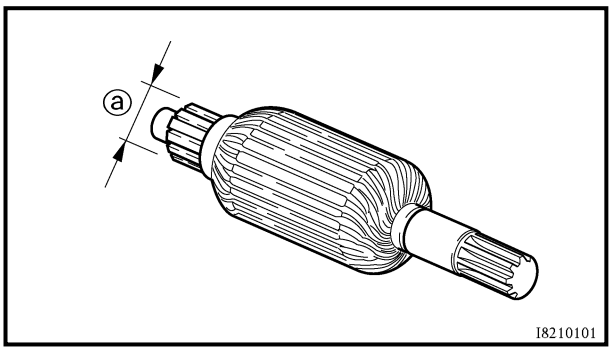


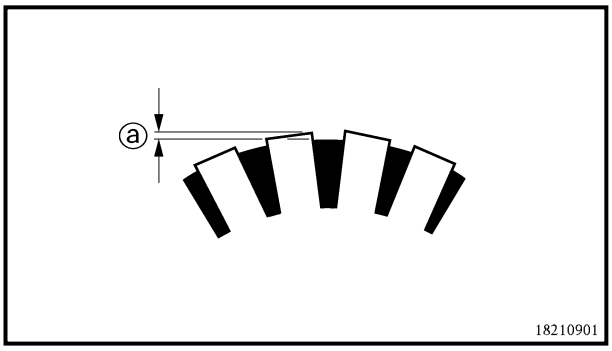
Order	Job/Part	Q'ty	Remarks
	Removing the starter motor		Remove the parts in the order listed.
	Rider seat		Refer to "SEATS" in chapter 3.
	Fuel tank		Refer to "FUEL TANK" in chapter 3.
	Left side cowling		Refer to "COWLINGS" in chapter 3.
1	EXUP servomotor	1	
2	Throttle stop screw	1	
3	Starter motor lead	1	
4	Starter motor assembly	1	
			For installation, reverse the removal procedure.

EB803501



Order	Job/Part	Q'ty	Remarks
	Disassembling the starter motor		Remove the parts in the order listed.
①	Starter motor front cover	1	
②	Lock washer	1	
③	Oil seal	1	
④	Bearing	1	
⑤	Washer set	1	
⑥	Starter motor rear cover	1	
⑦	Washer set	1	
⑧	Armature assembly	1	
⑨	Brush seat (along with the brushes)	1	
⑩	Brush holder (along with the brushes)	1	
⑪	O-ring	2	
⑫	Starter motor yoke	1	
			For assembly, reverse the disassembly procedure





EB803511
CHECKING THE STARTER MOTOR

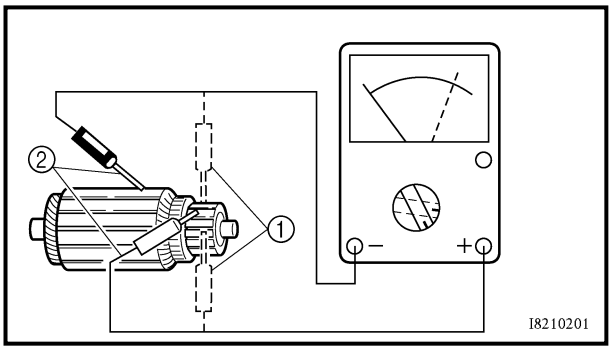
1. Check:
 • commutator
 Dirt → Clean with 600 grit sandpaper.
2. Measure:
 • commutator diameter ⓐ
 Out of specification → Replace the starter motor.

Min. commutator diameter
27 mm

3. Measure:
 • mica undercut ⓐ
 Out of specification → Scrape the mica to the proper measurement with a hacksaw blade which has been grounded to fit the commutator.

Mica undercut
0.7 mm

NOTE:
The mica must be undercut to ensure proper operation of the commutator.



4. Measure:
 • armature assembly resistances (commutator and insulation)
 Out of specification → Replace the starter motor.

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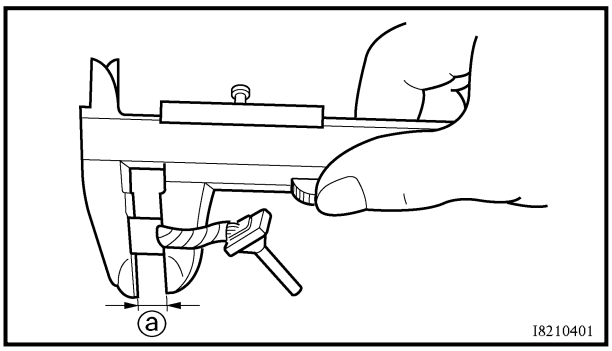
a. Measure the armature assembly resistances with the pocket tester.

Pocket tester
90890-03112

Armature assembly
Commutator resistance ①
0.025 ~ 0.035 Ω at 20 ˚C
Insulation resistance ②
Above 1 MΩ at 20 ˚C

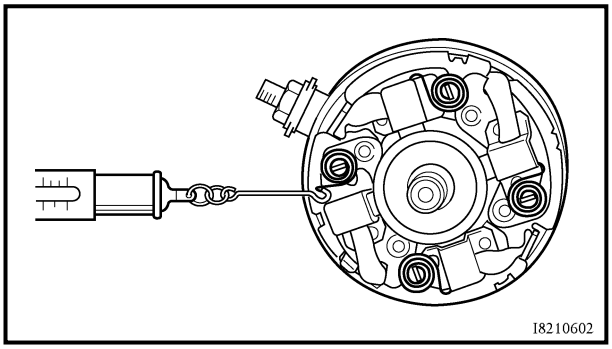
b. If any resistance is out of specification, replace the starter motor.

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5. Measure:
 • brush length ⓐ
 Out of specification → Replace the brushes as a set.

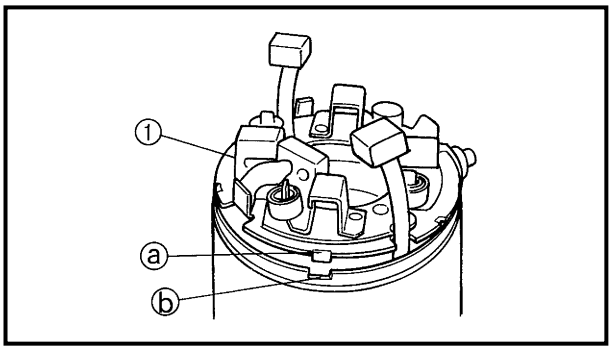
	Min. brush length 5 mm



6. Measure:
 • brush spring force
 Out of specification → Replace the brush springs as a set.

	Brush spring force 7.03 ~ 10.63 N (717 ~ 1,084 gf)

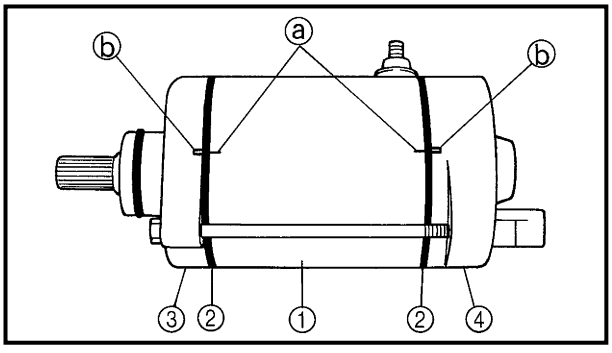
7. Check:
 • gear teeth
 Damage/wear → Replace the gear.
8. Check:
 • bearing
 • oil seal
 Damage/wear → Replace the defective part(-s).



EB803701
ASSEMBLING THE STARTER MOTOR

1. Install:
 • brush seat ①

NOTE:
Align the tab ⓐ on the brush seat with the slot ⓑ in the starter motor rear cover.

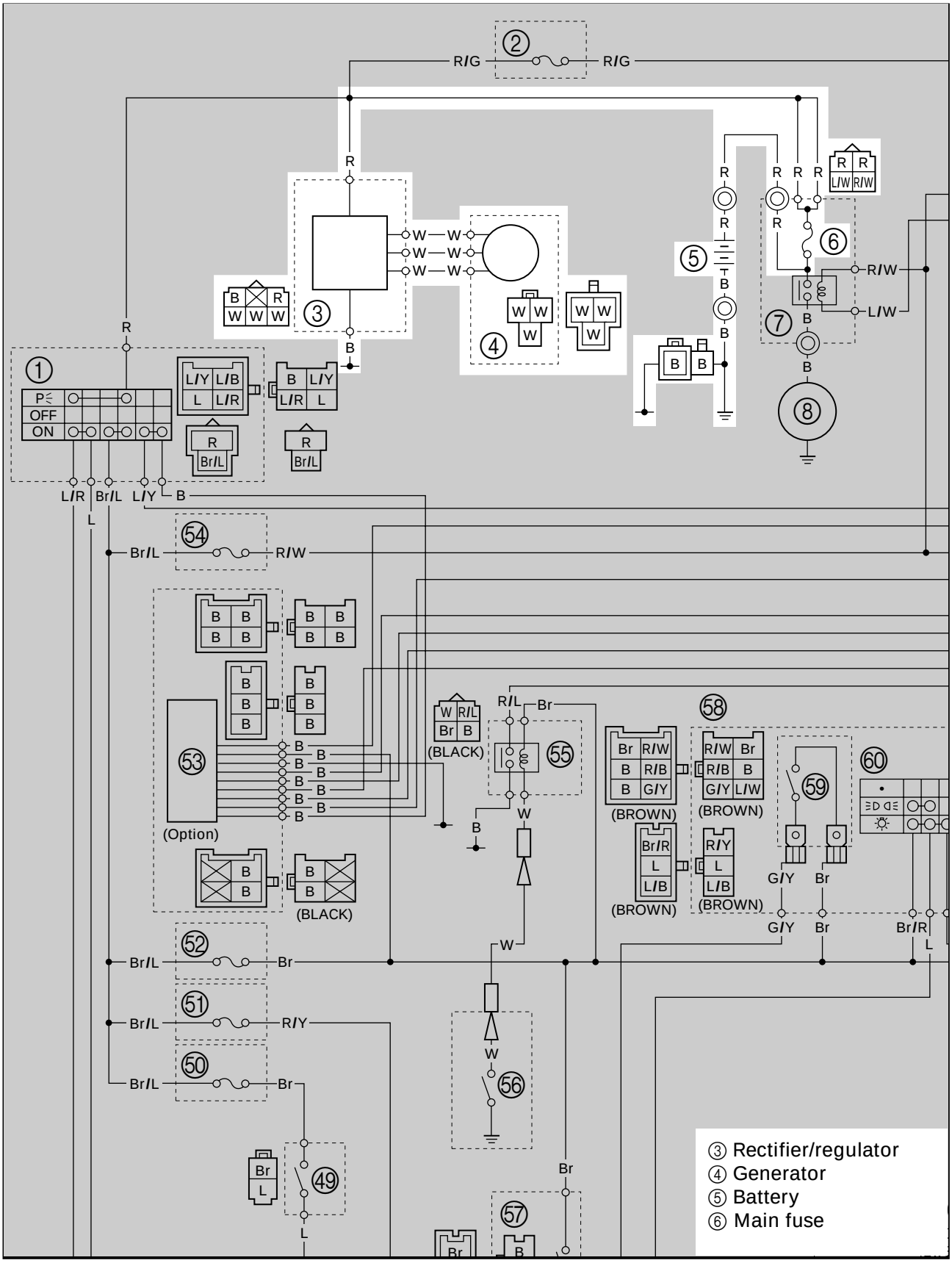


2. Install:
 • starter motor yoke ①
 • O-rings ② New
 • starter motor front cover ③
 • starter motor rear cover ④
 • bolts **5 Nm (0.5 m · kg)**

NOTE:
Align the match marks ⓐ on the starter motor yoke with the match marks ⓑ on the front and rear covers.

EB804000
CHARGING SYSTEM

CIRCUIT DIAGRAM



EB804010
TROUBLESHOOTING

The battery is not being charged.

Check:
1. main fuse
2. battery
3. charging voltage
4. stator coil assembly resistance
5. wiring
 (of the entire charging system)

NOTE:
- Before troubleshooting, remove the following part(-s):

1) rider seat
2) fuel tank

- Troubleshoot with the following special tool(-s).



Engine tachometer
90890-03113
Pocket tester
90890-03112

EB802400
1.Main fuse

- Check the main fuse for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Is the main fuse OK?

YES → NO

Replace the fuse.

EB802401
2.Battery

- Check the condition of the battery. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.

Open-circuit voltage
12.8 V or more at 20 ˚C

- Is the battery OK?

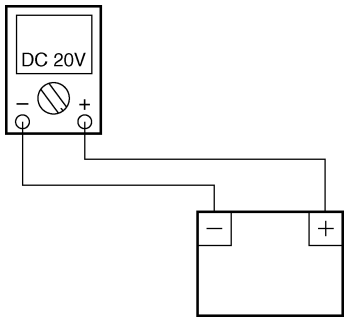
YES → NO

- Clean the battery terminals.
- Recharge or replace the battery.

EB804400
3.Charging voltage

- Connect the engine tachometer to the spark plug lead of cylinder #1.
- Connect the pocket tester (DC 20V) to the battery as shown.

Tester positive probe →
battery positive terminal
Tester negative probe →
battery negative terminal



- Start the engine and let it run at approximately 5,000 r/min.
- Measure the charging voltage.

Charging voltage
14 V at 5,000 r/min

NOTE:
Make sure that the battery is fully charged.

- Is the charging voltage within specification?

NO → Replace the stator coil assembly.

YES → The charging circuit is OK.

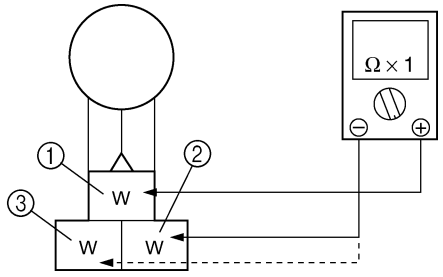
EB804401

4.Stator coil assembly resistances

- Remove the generator cover.
- Connect the pocket tester (Ω × 1) to the stator coil assembly coupler as shown.

Tester positive probe → white ①
Tester negative probe → white ②

Tester positive probe → white ①
Tester negative probe → white ③



- Measure the stator coil assembly resistances.

Stator coil resistance
0.45 ~ 0.55 Ω at 20 ˚C

- Is the stator coil assembly OK?

YES → Properly connect or repair the charging system's wiring.

NO → Replace the rectifier/regulator.

EB804404

5.Wiring

- Check the wiring connections of the entire charging system.
 Refer to "CIRCUIT DIAGRAM".
- Is the charging system's wiring properly connected and without defects?

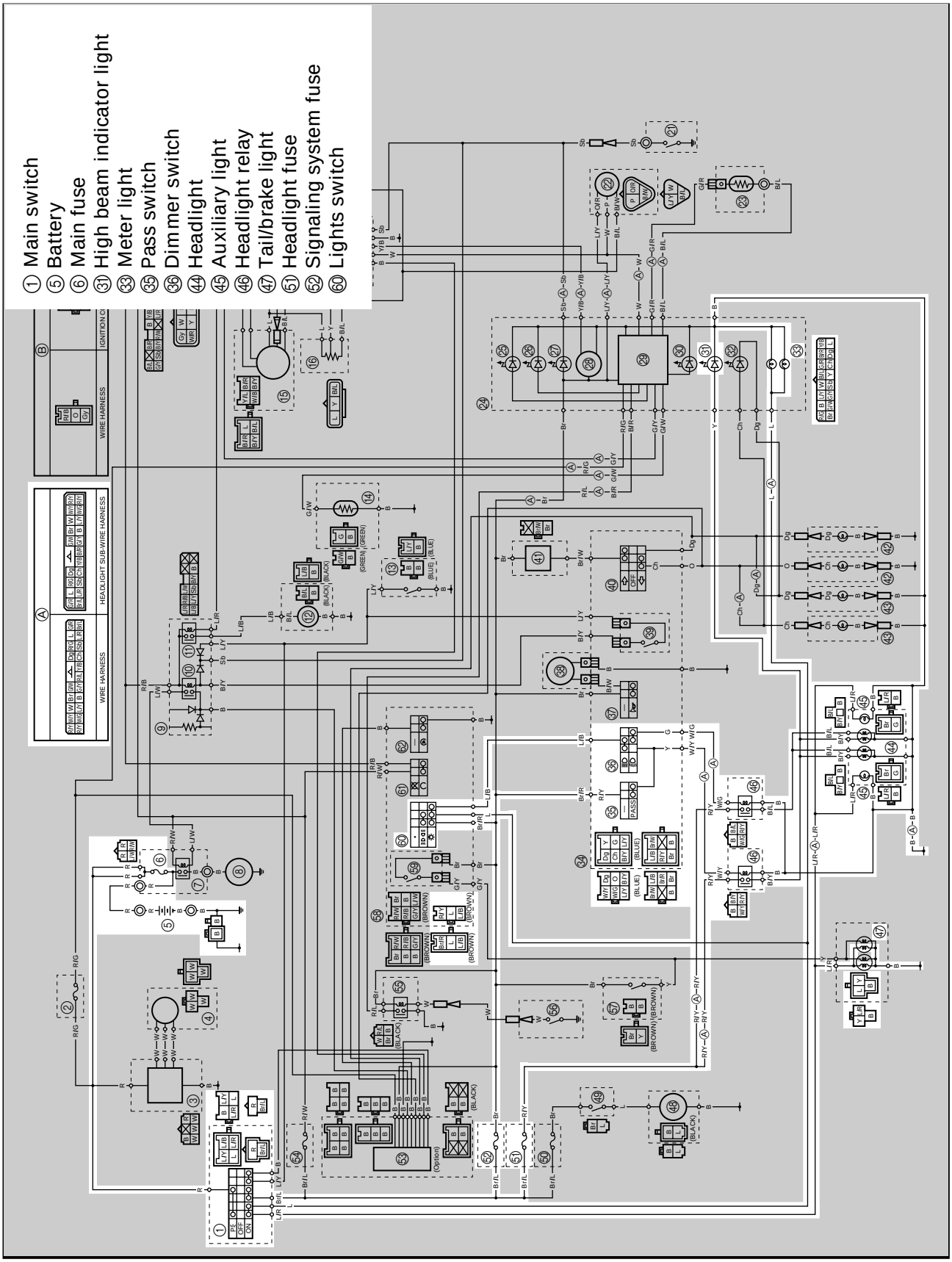
NO → Properly connect or repair the charging system's wiring.

YES → Replace the rectifier/regulator.

EB805000

LIGHTING SYSTEM

CIRCUIT DIAGRAM



EB805010
TROUBLESHOOTING

Any of the following fail to light: headlight, high beam indicator light, taillight, auxiliary light or meter light.

Check:
1. main, signaling system, and headlight fuses
2. battery
3. main switch
4. lights switch
5. dimmer switch
6. pass switch
7. wiring
 (of the entire charging system)

NOTE:
- Before troubleshooting, remove the following part(-s):

1) seats
2) fuel tank
3) air filter case
4) front cowling inner panels
5) front cowling
6) rear cowling

- Troubleshoot with the following special tool(-s).



Pocket tester
90890-03112

EB802400

1.Main, signaling system, and headlight fuses

- Check the main, signaling system, and headlight fuses for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main, signaling system, and headlight fuses OK?

YES → NO: Replace the fuse(-s).

EB802401

2.Battery

- Check the condition of the battery. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Open-circuit voltage
12.8 V or more at 20 ˚C

- Is the battery OK?

YES → NO:
- Clean the battery terminals.
- Recharge or replace the battery.

EB802411

3.Main switch

- Check the main switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

YES → NO: Replace the main switch.

EB805400

4.Lights switch

- Check the lights switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the lights switch OK?

YES → NO: The lights switch is faulty. Replace the right handlebar switch.

EB805401

5.Dimmer switch

- Check the dimmer switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the dimmer switch OK?

YES

NO

The dimmer switch is faulty. Replace the left handlebar switch.

EB805403

6.Pass switch

- Check the pass switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the pass switch OK?

YES

NO

The pass switch is faulty. Replace the left handlebar switch.

EB805404

7.Wiring

- Check the entire lighting system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the lighting system's wiring properly connected and without defects?

YES

NO

Check the condition of each of the lighting system's circuits. Refer to "CHECKING THE LIGHTING SYSTEM".

Properly connect or repair the lighting system's wiring.

EB805410

CHECKING THE LIGHTING SYSTEM

1. The headlight and the high beam indicator light fail to come on.

1.Headlight bulb and socket

- Check the headlight bulb and socket for continuity. Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Are the headlight bulb and socket OK?

YES

NO

Replace the headlight bulb, socket or both.

2.High beam indicator light LED

- Check the LED of the high beam indicator light. Refer to "CHECKING THE LEDs".
- Is the high beam indicator light LED OK?

YES

NO

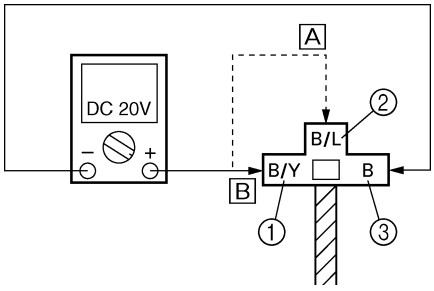
Replace the motor assembly.

3.Voltage

- Connect the pocket tester (DC 20V) to the headlight and high beam indicator light couplers as shown.

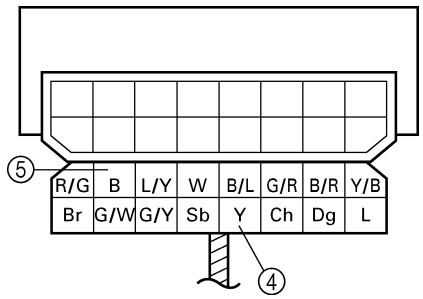
A When the dimmer switch is set to "≡D"
B When the dimmer switch is set to "≡D"

Headlight coupler (wire harness side)



Headlight
Tester positive probe →
black/yellow ① or black/blue ②
Tester negative probe → black ③
High beam indicator light
Tester positive probe → yellow ④
Tester negative probe → black ⑤

Meter assembly coupler (wire harness side)



- Set the main switch to "ON".
- Set the light switch to " ☼ ".
- Set the dimmer switch to "≣D" or "≣D".
- Measure the voltage (12 V) of black/yellow (black/blue) ② on the headlight coupler (headlight side).
- Is the voltage within specification?

YES

NO

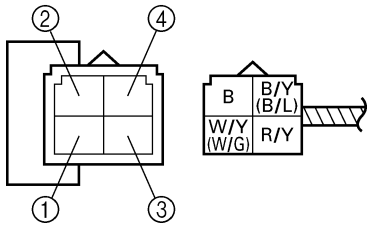
The wiring circuit from the main switch to the headlight coupler is faulty and must be repaired.

4.Headlight relay

- Disconnect the headlight relay from the coupler.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the headlight relay terminals as shown.

Battery positive terminal →
red/yellow ①
Battery negative terminal →
black/yellow (black/blue) ②

Tester positive probe →
white/yellow (white/green) ③
Tester negative probe → black ④



- Does the headlight relay have continuity between white/yellow (white/green) and black?

YES

NO

This circuit is OK.

Replace the headlight relay.

EB805411
2. A meter light fails to come on.

1.Meter light bulb and socket

- Check the meter light bulb and socket for continuity.
 Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Are the meter light bulb and socket OK?

YES

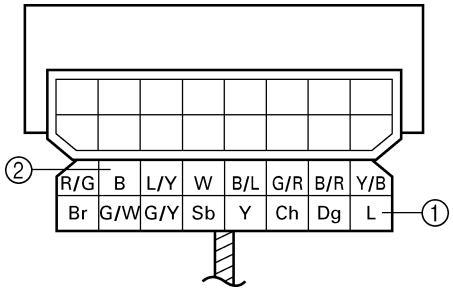
NO

Replace the meter light bulb, socket or both.

2.Voltage

- Connect the pocket tester (20 V) to the meter assembly coupler (wire harness side) as shown.

Tester positive probe → blue ①
Tester negative probe → black ②



- Set the main switch to “ON”.
- Set the light switch to “≡D ◁≡” or “ ☼ ”.
- Measure the voltage (12 V) of blue ① on the meter assembly coupler (wire harness side).
- Is the voltage within specification?

YES → This circuit is OK.

NO → The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

- Set the main switch to “ON”.
- Set the light switch to “≡D ◁≡” or “ ☼ ”.
- Measure the voltage (12 V) of blue/red ① on the tail/brake light coupler (wire harness side).
- Is the voltage within specification?

YES → This circuit is OK.

NO → The wiring circuit from the main switch to the tail/brake light coupler is faulty and must be repaired.

EB805412

3. A tail/brake light fails to come on.

1.Tail/brake light bulb and socket

- Check the tail/brake light bulb and socket for continuity.
 Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the tail/brake light bulb and socket OK?

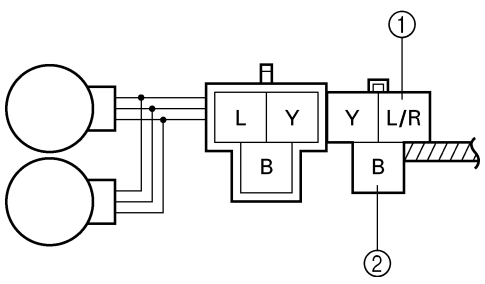
YES → 2.Voltage

NO → Replace the tail/brake light bulb, socket or both.

2.Voltage

- Connect the pocket tester (DC 20V) to the tail/brake light coupler (wire harness side) as shown.

Tester positive probe → blue/red ①
Tester negative probe → black ②



EB805413

4. The auxiliary light fails to come on.

1.Auxiliary light bulb and socket

- Check the auxiliary light bulb and socket for continuity.
 Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the auxiliary light bulb and socket OK?

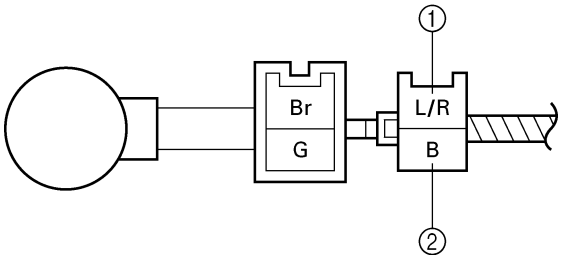
YES → 2.Voltage

NO → Replace the auxiliary light bulb, socket or both.

2.Voltage

- Connect the pocket tester (DC 20V) to the auxiliary light couplers (wire harness side) as shown.

Tester positive probe → blue/red ①
Tester negative probe → black ②



- Set the main switch to “ON”.
- Set the light switch to “≡D ◁≡” or “ ☼ ”.
- Measure the voltage (12 V) of blue/red ① on the auxiliary light couplers (wire harness side).
- Is the voltage within specification?

YES

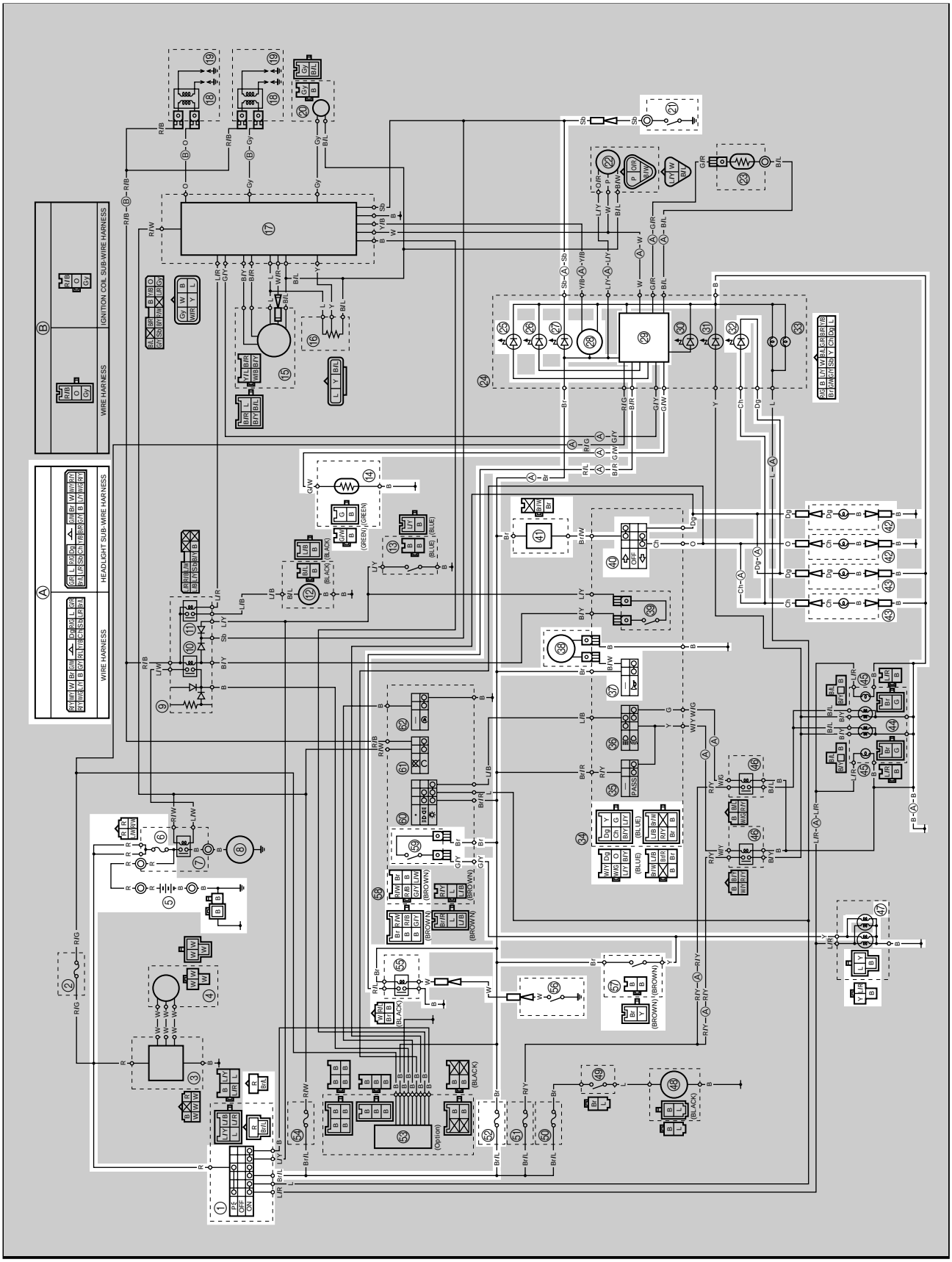
This circuit is OK.

NO

The wiring circuit from the main switch to the auxiliary light connectors is faulty and must be repaired.

EB806000
SIGNALING SYSTEM

CIRCUIT DIAGRAM



① Main switch
⑤ Battery
⑥ Main fuse
⑭ Fuel sender
㉑ Neutral switch
㉕ Fuel level indicator light
㉖ Oil level/coolant temperature warning light
㉗ Neutral indicator light
㉘ Tachometer
㉙ Combination meter
㉜ Turn signal indicator light
㊲ Horn switch
㊳ Horn
㊵ Turn signal switch
㊶ Turn signal relay
㊷ Rear turn signal light
㊸ Front turn signal light
㊼ Tail/brake light
㊷ Signaling system fuse
㊺ Oil level relay
㊻ Oil level switch
㊼ Rear brake light switch
㊾ Front brake light switch

EB806010
TROUBLESHOOTING

- **Any of the following fail to light: turn signal light, brake light or an indicator light.**
- **The horn fails to sound.**

Check:
1. main and signaling system fuses
2. battery
3. main switch
4. wiring
 (of the entire signaling system)

NOTE:
- Before troubleshooting, remove the following part(-s):

1) seats
2) fuel tank
3) air filter case
4) front cowling inner panels
5) bottom cowling
6) left side cowling
7) windshield
8) rear cowling

- Troubleshoot with the following special tool(-s).



Pocket tester
90890-03112

EB802400
1.Main and signaling system fuses

- Check the main and signaling system fuses for continuity.
 Refer to "CHECKING AND CHARGING THE FUSES" in chapter 3.
- Are the main and signaling system fuses OK?

YES → NO

Replace the fuse(-s).

EB802401
2.Battery

- Check the condition of the battery.
 Refer to "CHECKING THE BATTERY" in chapter 3.



Open-circuit voltage
12.8 V or more at 20 ˚C

- Is the battery OK?

YES → NO

- Clean the battery terminals.
- Recharge or replace the battery.

EB802411
3.Main switch

- Check the main switch for continuity.
 Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

YES → NO

Replace the main switch.

EB806400
4.Wiring

- Check the entire signaling system's wiring.
 Refer to "CIRCUIT DIAGRAM".
- Is the signaling system's wiring properly connected and without defects?

YES → NO

Check the condition of each of the signaling system's circuits.
Refer to "CHECKING THE SIGNALING SYSTEM".

Properly connect or repair the signaling system's wiring.

EB806410
CHECKING THE SIGNALING SYSTEM

1. The horn fails to sound.

1.Horn switch

- Check the horn switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the horn switch OK?

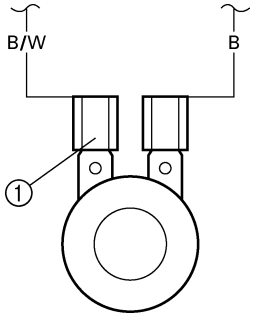
YES → **2.Voltage**

NO → Replace the left handlebar switch.

2.Voltage

- Connect the pocket tester (DC 20V) to the horn connector at the horn terminal as shown.

Tester positive probe → black/white ①
Tester negative probe → ground



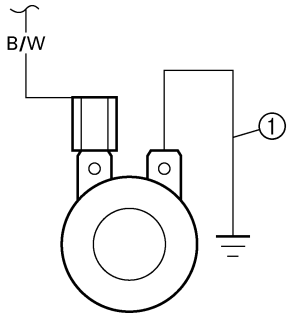
- Set the main switch to "ON".
- Push the horn switch.
- Measure the voltage (12V) of black/white at the horn terminal.
- Is the voltage within specification?

YES → **3.Horn**

NO → The wiring circuit from the main switch to the horn connector is faulty and must be repaired.

3.Horn

- Disconnect the black connector at the horn terminal.
- Connect a jumper lead ① to the horn terminal and ground the jumper lead.
- Set the main switch to "ON".
- Push the horn switch.
- Does the horn sound?



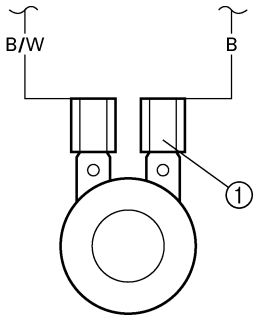
NO → **4.Voltage**

YES → The horn is OK.

4.Voltage

- Connect the pocket tester (DC 20V) to the horn connector at the black terminal as shown.

Tester positive probe → black ①
Tester negative probe → ground



- Set the main switch to "ON".
- Measure the voltage (12V) of black ① at the horn terminal.
- Is the voltage within specification?

YES → Repair or replace the horn.

NO → Replace the horn.

EB806411
2. A tail/brake light fails to come on.

1.Tail/brake light bulb and socket

- Check the tail/brake light bulb and socket for continuity.
 Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Are the tail/brake light bulb and socket OK?

YES → 2.Brake light switches

NO → Replace the tail/brake light bulb, socket or both.

2.Brake light switches

- Check the brake light switches for continuity.
 Refer to "CHECKING THE SWITCHES".
- Is the brake light switch OK?

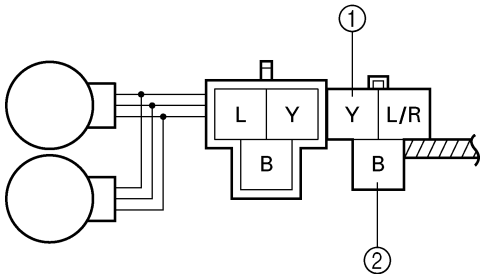
YES → 3.Voltage

NO → Replace the brake light switch.

3.Voltage

- Connect the pocket tester (DC 20V) to the tail/brake light coupler (wire harness side) as shown.

Tester positive probe → **yellow** ①
Tester negative probe → **black** ②



- Set the main switch to "ON".
- Pull in the brake lever or push down on the brake pedal.
- Measure the voltage (12 V) of yellow at the tail/brake light coupler (wire harness side).
- Is the voltage within specification?

YES → This circuit is OK.

NO → The wiring circuit from the main switch to the tail/brake light coupler is faulty and must be repaired.

EB806413
3. A turn signal light, turn signal indicator light or both fail to blink.

1.Turn signal light bulb and socket

- Check the turn signal light bulb and socket for continuity.
 Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Are the turn signal light bulb and socket OK?

YES → 2.Turn signal indicator light LED

NO → Replace the turn signal light bulb, socket or both.

2.Turn signal indicator light LED

- Check the LED of the turn signal indicator light.
 Refer to "CHECKING THE LEDs".
- Is the turn signal indicator light LED OK?

YES → Replace the meter assembly.

NO → Replace the meter assembly.

3.Turn signal switch

- Check the turn signal switch for continuity.
 Refer to "CHECKING THE SWITCHES".
- Is the turn signal switch OK?

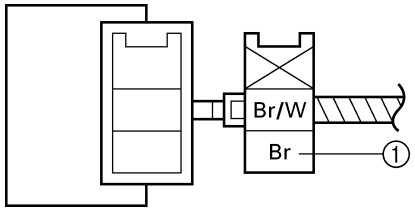
YES

NO → Replace the left handlebar switch.

4.Voltage

- Connect the pocket tester (DC 20V) to the turn signal relay coupler (wire harness side) as shown.

Tester positive probe → brown ①
Tester negative probe → ground



- Set the main switch to "ON".
- Measure the voltage (12V) of brown ① at the turn signal relay coupler (wire harness side).
- Is the voltage within specification?

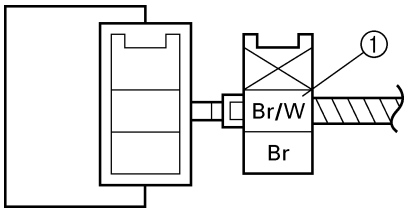
YES

NO → The wiring circuit from the main switch to the turn signal relay coupler (turn signal relay side) is faulty and must be repaired.

5.Voltage

- Connect the pocket tester (DC 20V) to the turn signal relay coupler (wire harness side) as shown.

Tester positive probe → brown/white ①
Tester negative probe → ground



- Set the main switch to "ON".
- Set the turn signal switch to "⇦" or "⇨".
- Measure the voltage (12V) of brown/white at the turn signal relay coupler (wire harness side).
- Is the voltage within specification?

YES

NO → The turn signal relay is faulty and must be replaced.

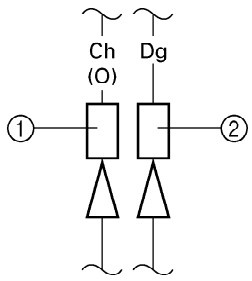
6.Voltage

- Connect the pocket tester (DC 20V) to the turn signal light connectors or the meter assembly coupler (wire harness side) as shown.

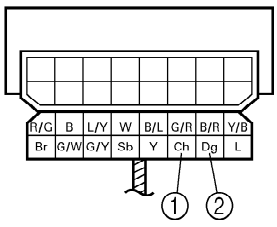
A Turn signal light
B Turn signal indicator light

Left turn signal light
Tester positive probe → chocolate (orange) ①
Tester negative probe → ground
Right turn signal light
Tester positive probe → dark green ②
Tester negative probe → ground

A



B



- Set the main switch to “ON”.
- Set the turn signal switch to “⇦” or “⇨”.
- Measure the voltage (12V) of chocolate (orange) ① or dark green ② at the turn signal light connector (wire harness side).
- Is the voltage within specification?

YES → This circuit is OK.

NO → The wiring circuit from the turn signal switch to the turn signal light connector is faulty and must be repaired.

EB806414

4. The neutral indicator light fails to come on.

1.Neutral indicator light LED

- Check the LED of the neutral indicator light.
 Refer to “CHECKING THE LEDs”.
- Is the neutral indicator light LED OK?

YES → **2.Neutral switch**

- Check the neutral switch for continuity.
 Refer to “CHECKING THE SWITCHES”.
- Is the neutral switch OK?

YES → This circuit is OK.

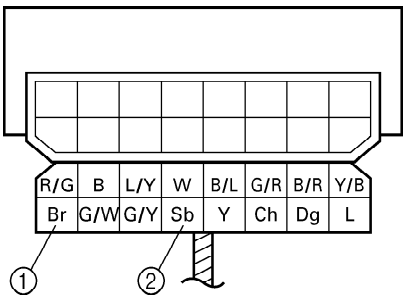
NO → Replace the neutral switch.

NO → Replace the meter assembly.

3.Voltage

- Connect the pocket tester (DC 20V) to the meter assembly coupler (wire harness side) as shown.

Tester positive probe → brown ①
Tester negative probe → sky blue ②



- Set the main switch to “ON”.
- Measure the voltage (12 V) of brown ① and sky blue ② at the meter assembly coupler.
- Is the voltage within specification?

YES → This circuit is OK.

NO → The wiring circuit from the main switch to the meter light bulb coupler is faulty and must be repaired.

EB806416

5. The oil level warning light fails to come on.

1.Oil level warning light LED

- Check the LED of the oil level warning light.
 Refer to “CHECKING THE LEDs”.
- Is the oil level warning light LED OK?

YES → This circuit is OK.

NO → Replace the meter assembly.

2.Oil level switch

- Drain the engine oil and remove the oil level switch from the oil pan.
- Check the oil level switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the oil level switch OK?

YES

NO

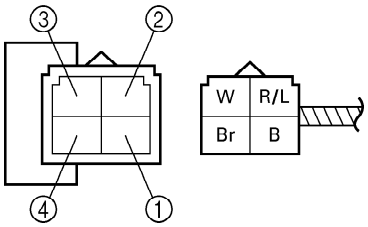
Replace the oil level switch.

3.Oil level relay

- Disconnect the oil level relay from the coupler.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the oil level relay terminals as shown.

Battery positive terminal → **brown** ①
Battery negative terminal → **white** ②

Tester positive probe → **red/blue** ③
Tester negative probe → **black** ④



- Does the oil level relay have continuity between red/blue and black?

YES

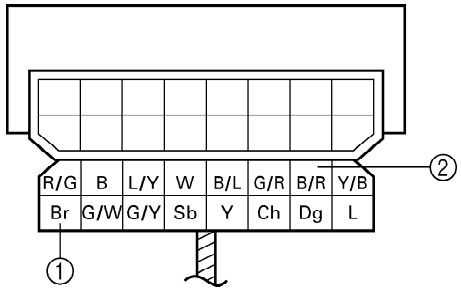
NO

Replace the oil level relay.

4.Voltage

- Connect the pocket tester (DC 20V) to the meter assembly coupler (wire harness side) as shown.

Tester positive probe → **brown** ①
Tester negative probe → **black/red** ②



- Set the main switch to "ON".
- Measure the voltage (12 V) of brown ① and black/red at the meter assembly coupler.
- Is the voltage within specification?

YES

NO

This circuit is OK.

The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

EB806417

6. The fuel level indicator light fails to come on.

1.Fuel level indicator light LED

- Check the LED of the fuel level indicator light.
 Refer to "CHECKING THE LEDs".
- Is the fuel level indicator light LED OK?

YES

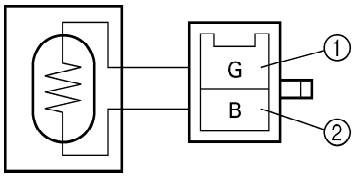
NO

Replace the meter assembly.

2.Fuel sender

- Disconnect the fuel sender coupler from the wire harness.
- Drain the fuel from the fuel tank and remove the fuel sender from the fuel tank.
- Check the fuel sender for continuity.

Tester positive probe → **green** ①
Tester negative probe → **black** ②



- Is the fuel sender OK?

YES → Replace the fuel sender.

NO →

- Set the main switch to "ON".
- Measure the voltage (12V).
- Is the voltage within specification?

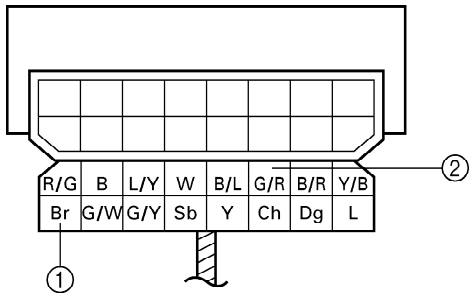
YES → This circuit is OK.

NO → The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

3.Voltage

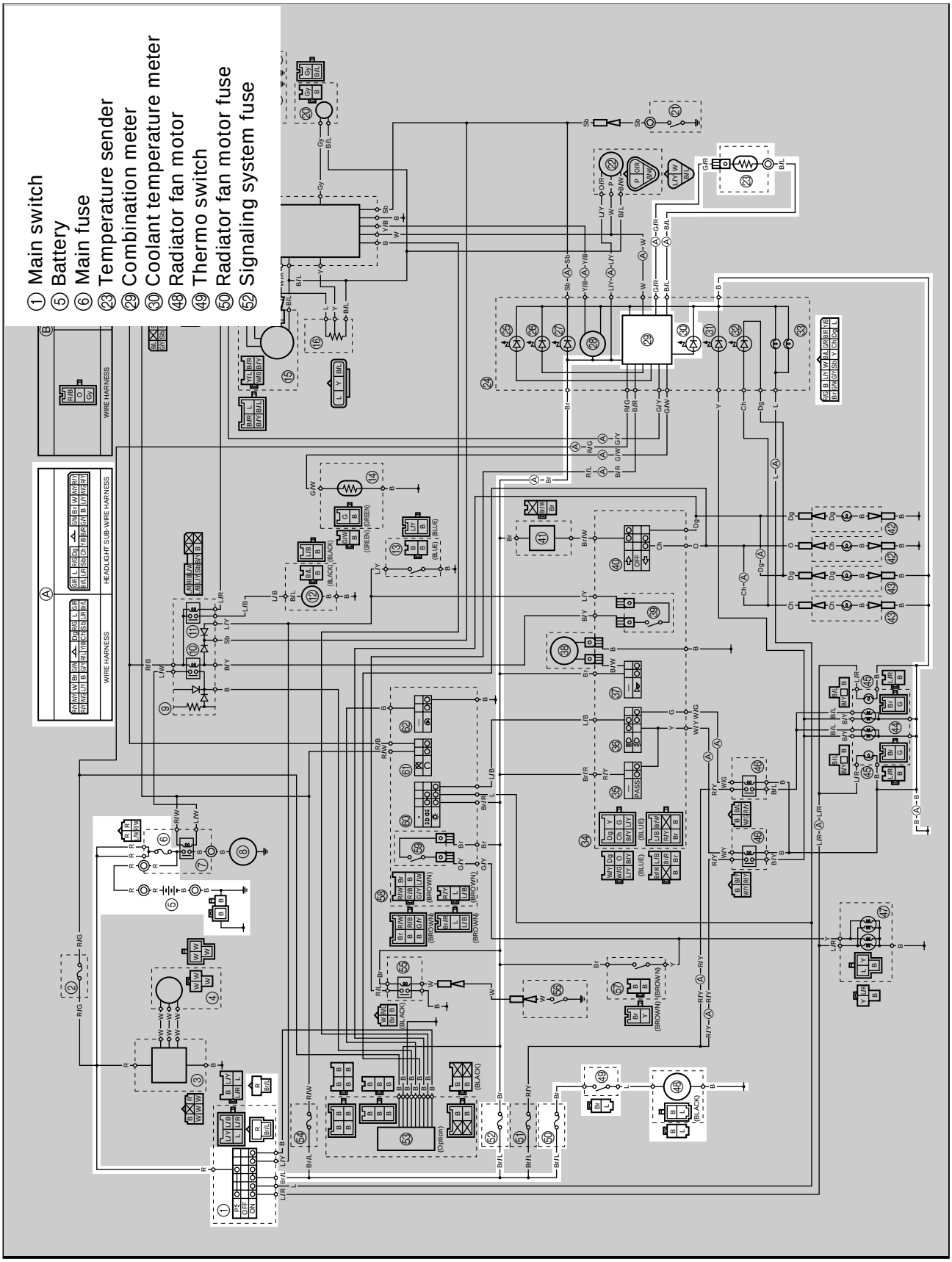
Connect the pocket tester (DC 20V) to the meter assembly coupler (wire harness side) as shown.

Tester positive probe → **brown** ①
Tester negative probe → **green/red** ②



EB807000
COOLING SYSTEM

CIRCUIT DIAGRAM



EB807010
TROUBLESHOOTING

• The radiator fan motor fails to turn.
• The coolant temperature meter needle fails to move when the engine is warm.

Check:
1. main, signal system, and radiator fan motor fuses
2. battery
3. main switch
4. radiator fan motor
5. thermo switch
6. temperature sender
7. wiring
 (the entire cooling system)

NOTE:
- Before troubleshooting, remove the following part(-s):

1) rider seat
2) bottom cowling
3) front cowling inner panels
4) left side cowling
5) windshield

- Troubleshoot with the following special tool(-s).



Pocket tester
90890-03112

EB802400

1.Main, signal system and radiator fan motor fuses

- Check the main, signal system, and radiator fan motor fuses for continuity.
 Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main, signal system, and radiator fan motor fuses OK?

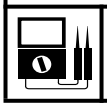
YES

NO → Replace the fuse(-s).

EB802401

2.Battery

- Check the condition of the battery.
 Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Open-circuit voltage
12.8 V or more at 20 ˚C

- Is the battery OK?

YES

NO →
- Clean the battery terminals.
- Recharge or replace the battery.

EB802411

3.Main switch

- Check the main switch for continuity.
 Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

YES

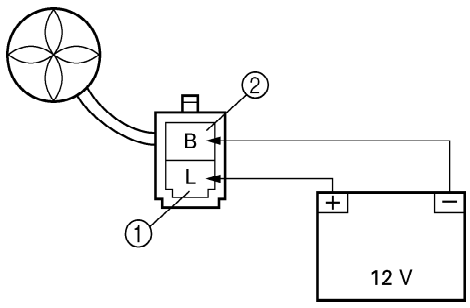
NO → Replace the main switch.

EB807400

4.Radiator fan motor (test 1)

- Disconnect the radiator fan motor coupler from the wire harness.
- Connect the battery (12 V) as shown.

Battery positive lead → blue ①
Battery negative lead → black ②



- Does the radiator fan motor turn?

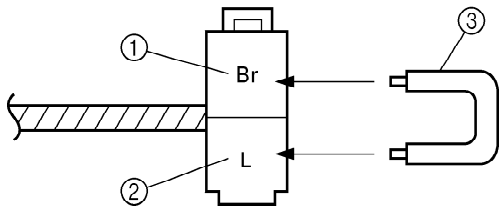
YES

NO → The radiator fan motor is faulty and must be replaced.

EB807400

5.Radiator fan motor (test 2)

- Disconnect the thermo switch coupler.
- Set the main switch to "ON".
- Connect the brown ① and blue ② terminals with a jumper lead ③ as shown.



- Does the radiator fan motor turn?

YES

NO

The wiring circuit from the main switch to the radiator fan motor coupler is faulty and must be repaired.

EB807402

6.Thermo switch

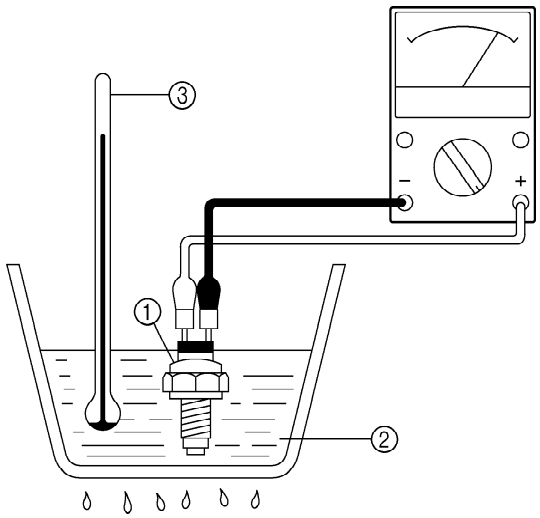
- Remove the thermo switch from the radiator.
- Connect the pocket tester ($\Omega \times 1$) to the thermo switch ① as shown.
- Immerse the thermo switch in a container filled with coolant ②.

NOTE:
Make sure that the thermo switch terminals do not get wet.

- Place a thermometer ③ in the coolant.
- Slowly heat the coolant, then let it cool to the specified temperature as indicated in the table.
- Check the thermo switch for continuity at the temperatures indicated in the table.

Test step	Coolant temperature / Thermo switch	Continuity
1	0 ~ 98 °C	NO
2	More than 105 ± 3 °C	YES
3*	105 to 98 °C	YES
4*	Less than 98 °C	NO

Test steps 1 & 2: Heating phase
Test steps 3* & 4*: Cooling phase



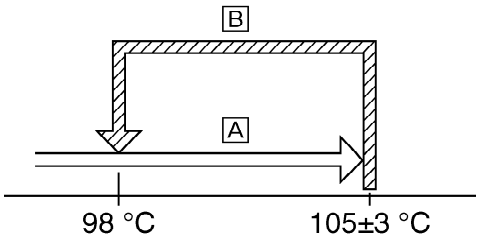
⚠ WARNING

- **Handle the thermo switch with special care.**
- **Never subject the thermo switch to strong shocks. If the thermo switch is dropped, replace it.**



Thermo switch
23 Nm (2.3 m • kg)
Three bond sealock® 10

A The thermo switch circuit is open and the radiator fan is off.
B The thermo switch circuit is closed and the radiator fan is on.



• Does the thermo switch operate properly as described above?

YES

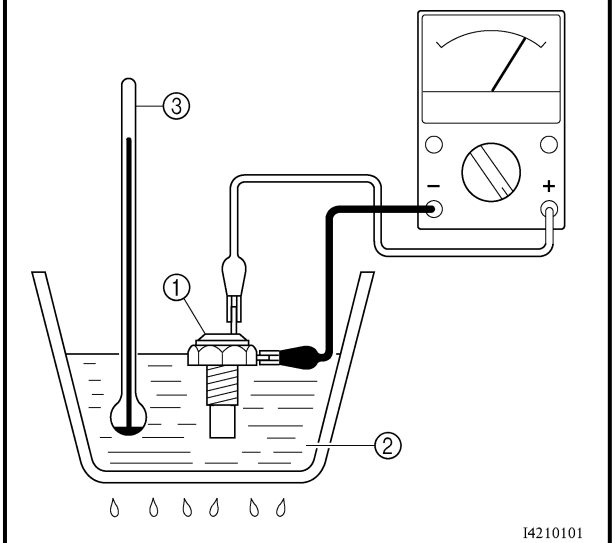
NO

Replace the thermo switch.

7.Temperature sender

• Remove the temperature sender from the radiator.
• Connect the pocket tester (Ω × 10) to the temperature sender ① as shown.
• Immerse the temperature sender in a container filled with water ②.
• Place a thermometer ③ in the water.
• Slowly heat the water, then let it cool down to the specified temperature.
• Check the temperature sender for continuity at the temperatures indicated below.

Temperature sender resistance
47.5 ~ 56.8 Ω at 80 °C
16.5 ~ 20.5 Ω at 115 °C



⚠ WARNING

Handle the temperature sender with special care.
Never subject the temperature sender to strong shocks. If the temperature sender is dropped, replace it.

Temperature sender
15 Nm (1.5 m • kg)
Three bond sealock® 10

YES

NO

Replace the temperature sender.

EB807403

8.Wiring

• Check the entire cooling system's wiring.
Refer to "CIRCUIT DIAGRAM".
• Is the cooling system's wiring properly connected and without defects?

YES

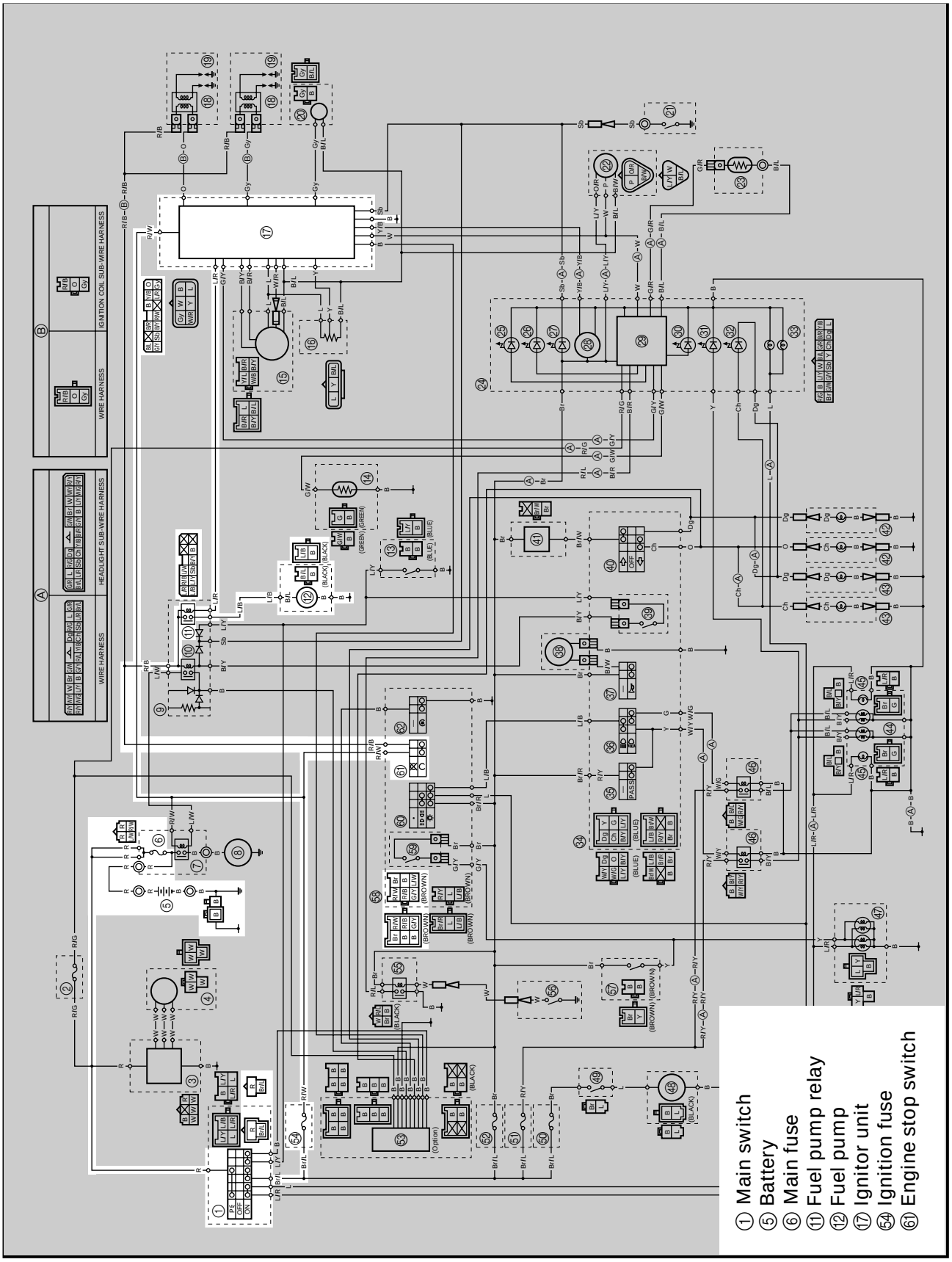
NO

This circuit is OK.

Properly connect or repair the cooling system's wiring.

EB808000
FUEL PUMP SYSTEM

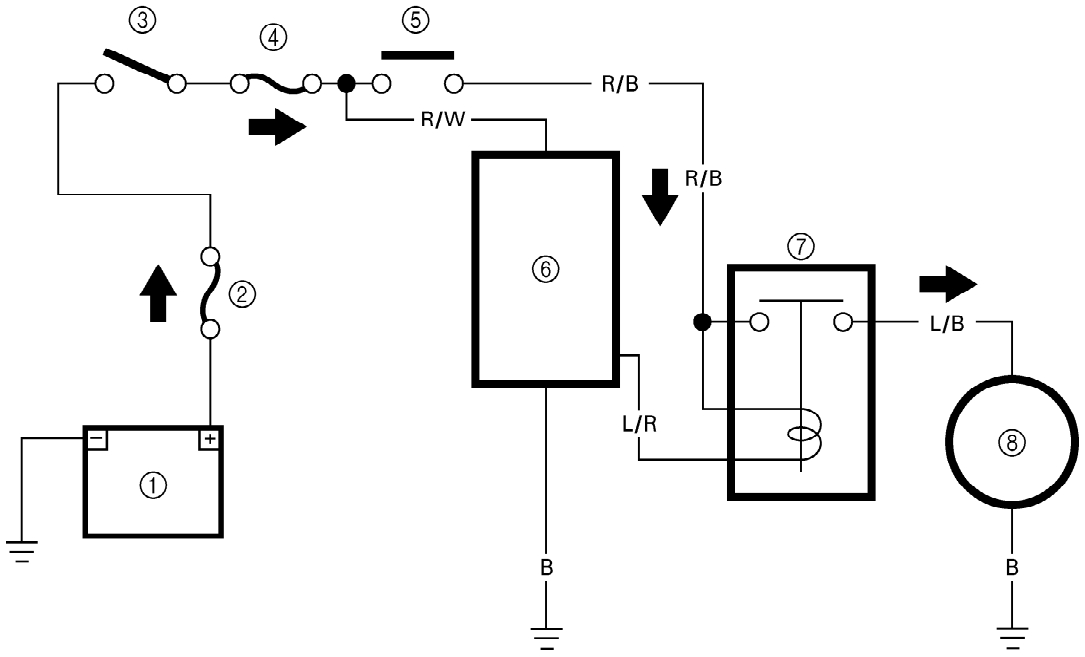
CIRCUIT DIAGRAM



EB808010
FUEL PUMP CIRCUIT OPERATION

The ignitor unit includes the control unit for the fuel pump.

① Battery
② Main fuse
③ Main switch
④ Ignition fuse
⑤ Engine stop switch
⑥ Ignitor unit
⑦ Fuel pump relay
⑧ Fuel pump



EB808020
TROUBLESHOOTING

The fuel pump fails to operate.

Check:
1. main and ignition fuses
2. battery
3. main switch
4. engine stop switch
5. fuel pump relay
6. fuel pump
7. wiring
 (the entire fuel pump system)

NOTE:
- Before troubleshooting, remove the following part(-s):

1) rider seat
2) fuel tank
3) air filter case
4) front cowling inner panel (left)

- Troubleshoot with the following special tool(-s).



Pocket tester
90890-03112

EB802400

1.Main and ignition fuses

- Check the main and ignition fuses for continuity.
 Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main and ignition fuses OK?

YES → NO

Replace the fuse(-s).

EB802401

2.Battery

- Check the condition of the battery.
 Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Open-circuit voltage
12.8 V or more at 20 ˚C

- Is the battery OK?

YES → NO

- Clean the battery terminals.
- Recharge or replace the battery.

EB802411

3.Main switch

- Check the main switch for continuity.
 Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

YES → NO

Replace the main switch.

EB802412

4.Engine stop switch

- Check the engine stop switch for continuity.
 Refer to "CHECKING THE SWITCHES".
- Is the engine stop switch OK?

YES → NO

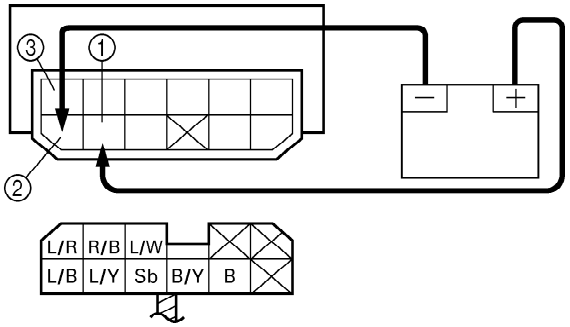
Replace the right handlebar switch.

5.Fuel pump relay

- Disconnect the relay unit from the coupler.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the relay unit terminals as shown.

Battery positive terminal → red/black ①
Battery negative terminal → blue/red ②

Tester positive probe → red/black ①
Tester negative probe → blue/black ③



- Does the fuel pump relay have continuity between red/black and blue/black?

YES → Replace the relay unit.

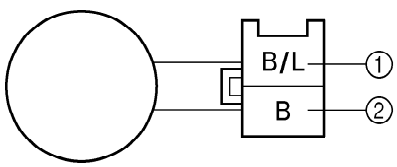
NO

EB808400

6.Fuel pump resistance

- Disconnect the fuel pump coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the fuel pump coupler (fuel pump side) as shown.

Tester positive probe → black/blue ①
Tester negative probe → black ②



- Measure the fuel pump resistance.

Fuel pump resistance
4 ~ 30 Ω at 20 ˚C

- Is the fuel pump OK?

YES

NO → Replace the fuel pump.

EB808401

7.Wiring

- Check the entire fuel pump system's wiring.
 Refer to "CIRCUIT DIAGRAM".
- Is the fuel pump system's wiring properly connected and without defects?

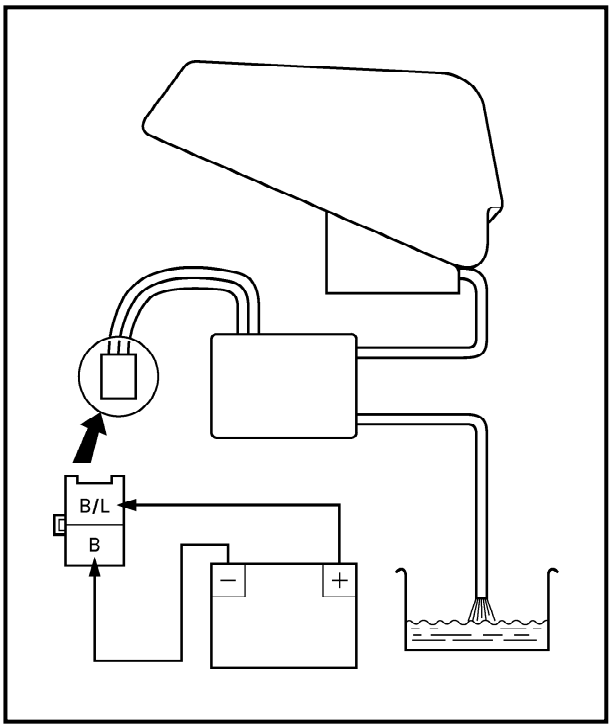
YES → Replace the ignitor unit.

NO → Properly connect or repair the fuel pump system's wiring.

EB808410
CHECKING THE FUEL PUMP

⚠ WARNING

Gasoline is extremely flammable and under certain circumstances there can be a danger of an explosion or fire. Be extremely careful and note the following points:
- **Stop the engine before refuelling.**
- **Do not smoke and keep away from open flames, sparks or any other source of fire.**
- **If you do accidentally spill gasoline, wipe it up immediately with dry rags.**
- **If gasoline touches the engine when it is hot, a fire may occur. Therefore, make sure that the engine is completely cool before performing the following test.**



1. Check:
 - fuel pump operation

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Fill the fuel tank.

b. Put the end of the fuel hose into an open container.

c. Connect the battery (12V) to the fuel pump coupler as shown.

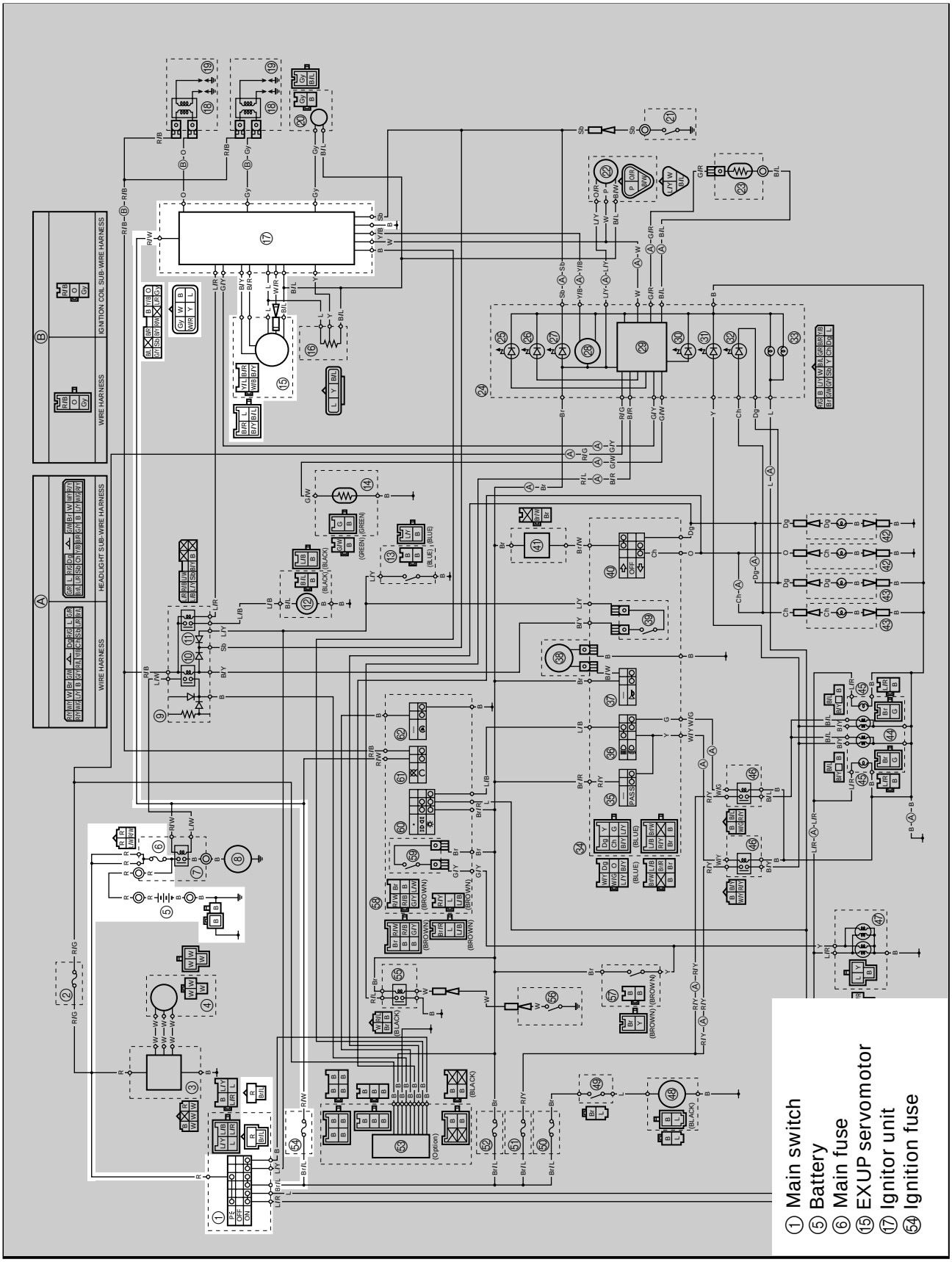
Battery positive lead → blue/black ①
Battery negative lead → black ②

d. If fuel flows out of the fuel hose, the fuel pump is OK. If fuel does not flow, replace the fuel pump.

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EB811000
EXUP SYSTEM

CIRCUIT DIAGRAM



EB811010
TROUBLESHOOTING

When the engine speed changes, the EXUP servomotor does not operate.

Procedure 1

Check:
1. Exup servomotor operation
 (with the EXUP servomotor coupler connected to the wire harness)
2. voltage
3. Exup servomotor operation
4. (with the EXUP servomotor coupler disconnected from the wire harness)
5. Exup servomotor resistance
6. wiring
 (the entire EXUP system)

Procedure 2

Check:
1. main and ignition fuses
2. battery
3. main switch
4. engine stop switch
5. wiring
 (the entire EXUP system)

NOTE:
- Before troubleshooting, remove the following part(-s):
1) rider seat
2) fuel tank
3) bottom cowling
- Troubleshoot with the following special tool(-s).

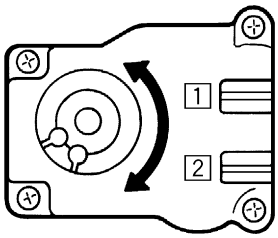


Pocket tester
90890-03112

EB811400
Procedure 1

1.EXUP servomotor operation (with the EXUP servomotor coupler connected to the wire harness)

- Disconnect the EXUP cables from the EXUP servomotor pulley.
- Start the engine and rev it to 2,000 r/min.



- Does the EXUP servomotor pulley turn?

NO

YES

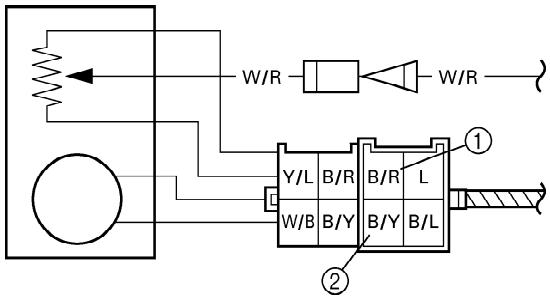
Check that the EXUP cables are properly installed. If OK, check the EXUP valve and cables. Refer to “ENGINE” in chapter 4.

EB811401

2.Voltage

- Connect the pocket tester (DC 20V) to the EXUP servomotor coupler (wire harness side) as shown.

Tester positive probe → black/red ①
Tester negative probe → black/yellow ②



- Set the main switch to “ON”.
- Measure the voltage (12V) between black/red ① and black/yellow ② (wire harness side).
- Is the voltage within specification?

YES

NO

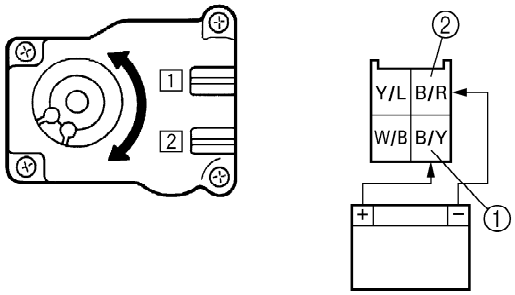
Go to Procedure 2.

EB811402

3.EXUP servomotor operation (with the servomotor coupler disconnected from the wire harness)

- Disconnect the EXUP cables from the EXUP servomotor pulley.
- Disconnect the EXUP servomotor coupler from the wire harness.
- Connect the battery leads to the EXUP servomotor coupler (servomotor side) as shown.

Battery positive terminal → black/yellow ①
Battery negative terminal → black/red ②



- Check that the EXUP servomotor pulley rotates several times.

CAUTION:

To prevent damaging the EXUP servomotor, perform this test within a few seconds of connecting the battery.

- Does the EXUP servomotor pulley turn?

YES

NO

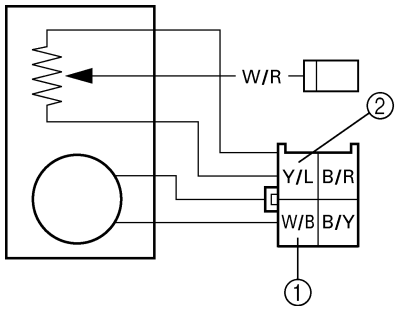
Replace the EXUP servomotor.

EB811403

4.EXUP servomotor resistance

- Disconnect the EXUP servomotor coupler from the wire harness.
- Connect the pocket tester (Ω × 1k) to the EXUP servomotor coupler.

Tester positive probe → white/black ①
Tester negative probe → yellow/blue ②

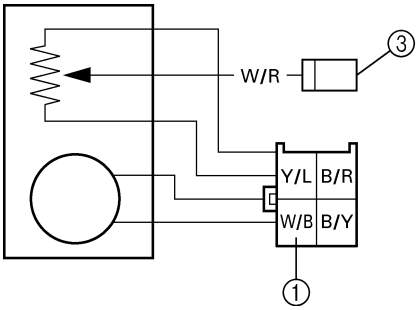


- Measure the EXUP servomotor resistance.

EXUP servomotor resistance
5.3 ~ 9.8 kΩ
(between white/black and yellow/blue)

- Connect the pocket tester (Ω × 1k) to the EXUP servomotor coupler.

Tester positive probe → white/black ①
Tester negative probe → white/red ③



- While slowly turning the EXUP servomotor pulley by hand, measure the EXUP servomotor resistance.

EXUP servomotor resistance (when the pulley is turned one full rotation)
0 ~ approximately 7.5 kΩ
(between white/black and white/red)

- Is the EXUP servomotor OK?

YES

NO

The EXUP servomotor is faulty and must be replaced.

EB811404

5.Wiring

- Check the entire EXUP system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the EXUP system's wiring properly connected and without defects?

YES → Replace the ignitor unit.

NO → Properly connect or repair the EXUP system's wiring.

EB811410

Procedure 2

EB802400

1.Main and ignition fuses

- Check the main and ignition fuses for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main and ignition fuses OK?

YES

NO → Replace the fuse(-s).

EB802401

2.Battery

- Check the condition of the battery. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Open-circuit voltage
12.8 V or more at 20 ˚C

- Is the battery OK?

YES

NO →
- Clean the battery terminals.
- Recharge or replace the battery.

EB802411

3.Main switch

- Check the main switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

YES

NO → Replace the main switch.

EB802412

4.Engine stop switch

- Check the engine stop switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the engine stop switch OK?

YES

NO → Replace the right handlebar switch.

EB811411

5.Wiring

- Check the entire EXUP system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the EXUP system's wiring properly connected and without defects?

YES → Go to "Procedure 1".

NO → Properly connect or repair the EXUP system's wiring.

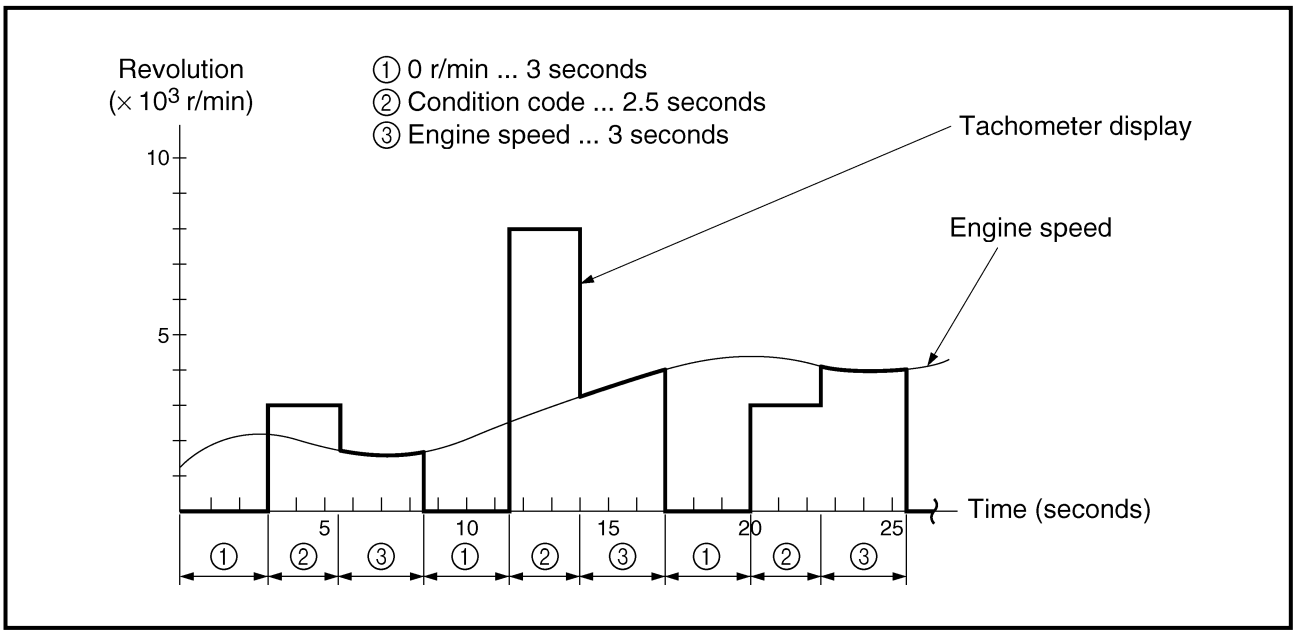
EB812000
SELF-DIAGNOSIS

The YZF-R1 features a self-diagnosing system for the following circuit(-s):
- throttle position sensor
- EXUP
- fuel level indicator light

If any of these circuits are defective, their respective condition codes will be displayed on the tachometer when the main switch is set to “ON” (irrespective of whether the engine is running or not)

Circuit	Defect(-s)	System response	Condition code
Throttle position sensor	• Disconnected • Short-circuit • Locked	• The ignitor unit stays set to the wide-open throttle ignition timing. The motorcycle can be ridden. • The tachometer displays the condition code.	3,000 r/min
EXUP	• Improper connection • Short-circuit	• The EXUP valve stays in the open position for three seconds and then the servomotor shuts off. The motorcycle can be ridden. • The tachometer displays the condition code.	7,000 r/min
	• Servomotor is locked.	• The servomotor’s power supply is constantly interrupted so that it will not burn out. The motorcycle can be ridden. • The tachometer displays the condition code.	
Fuel level indicator light	• Improper connection	• The tachometer displays the condition code.	8,000 r/min

Tachometer display sequence



When more than one item is being monitored, the tachometer needle displays the condition codes in ascending order, cycling through the sequence repeatedly.
If the engine is stopped, the engine speed ③ is 0 r/min.

EB812010
TROUBLESHOOTING

The tachometer starts to display the self-diagnosis sequence.

Check:
1. throttle position sensor
2. Exup
3. fuel level indicator light

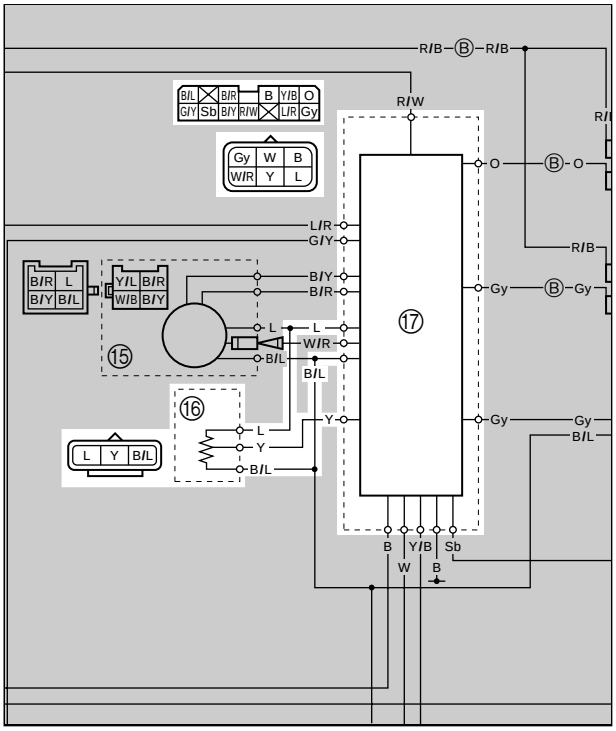
NOTE:
- Before troubleshooting, remove the following part(-s):

1) rider seat
2) fuel tank
3) air filter case

- Troubleshoot with the following special tool(-s).

	**Pocket tester** **90890-03112**

EB812020
1. Throttle position sensor
CIRCUIT DIAGRAM



⑯ Throttle position sensor
⑰ Ignitor unit

1.Wire harness
• Check the wire harness for continuity. Refer to “CIRCUIT DIAGRAM”. • Is the wire harness OK?

YES ⇩ NO ⇩

Repair or replace the wire harness.

EB812401

2.Throttle position sensor
• Check the throttle position sensor for continuity. Refer to “CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR” in chapter 6. • Is the throttle position sensor OK?

YES ⇩ NO ⇩

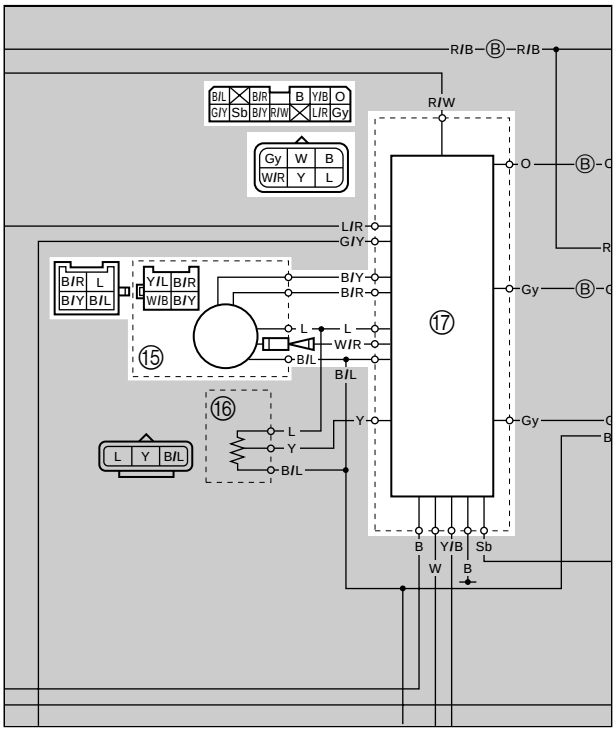
Replace the ignitor unit.

Replace the throttle position sensor.

EB812030

2. EXUP

CIRCUIT DIAGRAM



⑮ EXUP servomotor
⑰ Ignitor unit

EB812400

1.Wire harness
• Check the wire harness for continuity. Refer to “CIRCUIT DIAGRAM”. • Is the wire harness OK?

YES

NO

Repair or replace the wire harness.

EB812402

2.EXUP servomotor
• Check the EXUP servomotor for continuity. Refer to “EXUP SYSTEM”. • Is the EXUP servomotor OK?

YES

Replace the ignitor unit.

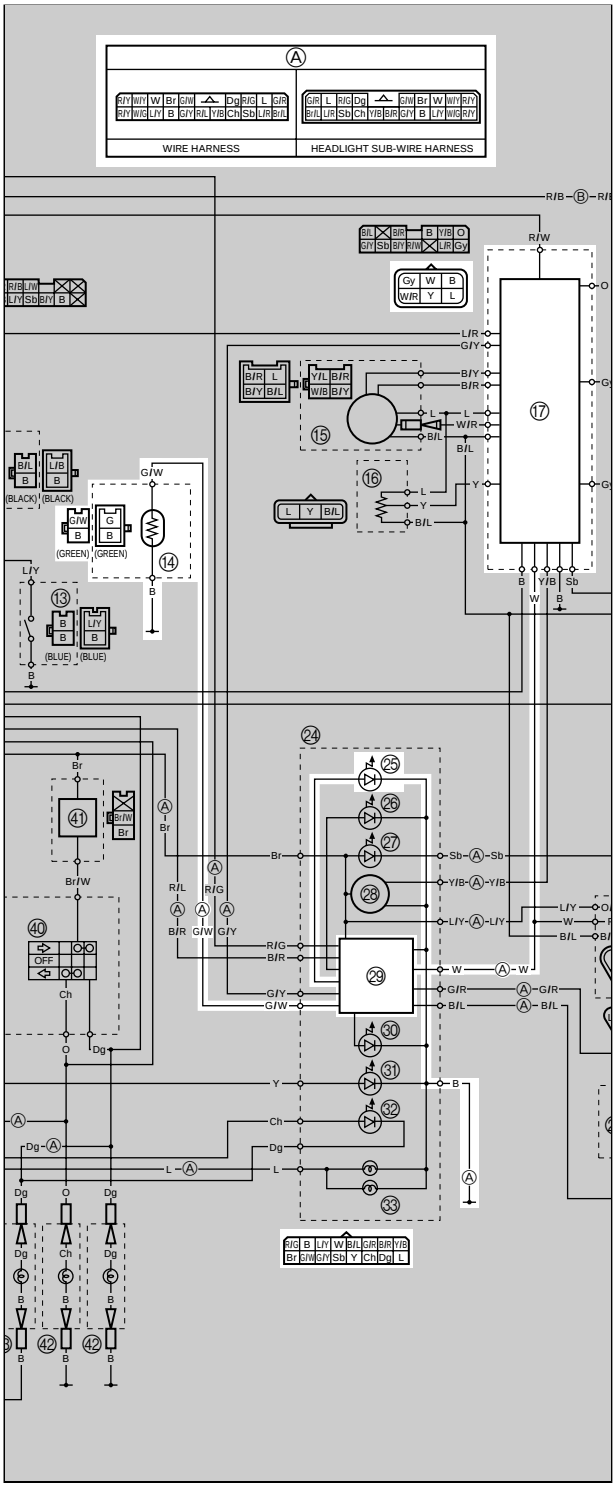
NO

Replace the EXUP servomotor.

EB812040

3. Fuel level indicator light

CIRCUIT DIAGRAM



⑭ Fuel sender
⑰ Ignitor unit
㉕ Fuel level indicator light
㉙ Combination meter

EB812403

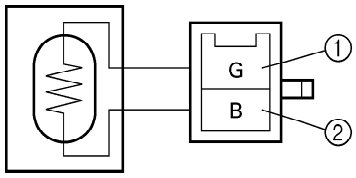
1.Fuel level indicator light LED
• Check the LED of the fuel level indicator light. Refer to "CHECKING THE LEDs". • Is the fuel level indicator light LED OK?

YES

NO

Repair the fuel level indicator light LED.

EB812404

2.Fuel sender
• Disconnect the fuel sender coupler from the wire harness. • Connect the pocket tester (W × 1) to the fuel sender coupler as shown.
Tester positive probe → green ① **Tester negative probe → black ②**

• Check the fuel sender for continuity. • Is the fuel sender OK?

YES

NO

Replace the fuel sender.

EB812405

3.Wire harness
• Check the wire harness for continuity. Refer to “CIRCUIT DIAGRAM”. • Is the wire harness OK?

YES → Replace the ignitor unit.

NO → Replace or replace the wire harness.

?

TRBL SHTG

9

CHAPTER 9.
TROUBLESHOOTING

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EB900000

TROUBLESHOOTING

NOTE:
The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

STARTING PROBLEMS

ENGINE

Cylinders and cylinder head(-s)
- Loose spark plug
- Loose cylinder head
- Damaged cylinder head gasket
- Worn or damaged cylinder
- Incorrect valve clearance
- Incorrectly sealed valve
- Incorrect valve-to-valve-seat contact
- Incorrect valve timing
- Faulty valve spring
- Seized valve

Pistons and piston rings
- Incorrectly installed piston ring
- Damaged, worn or fatigued piston ring
- Seized piston ring
- Seized or damaged piston

Air filter
- Incorrectly installed air filter
- Clogged air filter element

Crankcase and crankshaft
- Incorrectly assembled crankcase
- Seized crankshaft

ELECTRICAL SYSTEMS

Battery
- Faulty battery
- Discharged battery

Fuses
- Blown, damaged or incorrect fuse
- Incorrectly installed fuse

Spark plugs
- Incorrect spark plug gap
- Incorrect spark plug heat range
- Fouled spark plug
- Worn or damaged electrode
- Worn or damaged insulator
- Faulty spark plug cap

Ignition coils
- Damaged ignition coil
- Broken or shorted primary or secondary coils
- Faulty spark plug lead

FUEL SYSTEM

Fuel tank
- Empty fuel tank
- Clogged fuel filter
- Clogged fuel tank breather hose
- Clogged rollover valve (California only)
- Clogged rollover-valve-to-fuel-tank hose (California only)
- Deteriorated or contaminated fuel

Fuel pump
- Faulty fuel pump
- Faulty fuel pump relay

Fuel cock
- Clogged or damaged fuel hose

Carburetors
- Deteriorated or contaminated fuel
- Clogged pilot jet
- Clogged pilot air passage
- Sucked-in air
- Damaged float
- Worn needle valve
- Incorrectly installed needle valve seat
- Incorrect fuel level
- Incorrectly installed pilot jet
- Clogged starter jet
- Faulty starter plunger
- Incorrectly adjusted starter cable

Ignition system
- Faulty ignitor unit
- Faulty pickup coil

Switches and wiring
- Faulty main switch
- Faulty engine stop switch
- Broken or shorted wiring
- Faulty neutral switch
- Faulty start switch
- Faulty sidestand switch
- Faulty clutch switch
- Incorrectly grounded circuit
- Loose connections

Starting system
- Faulty starter motor
- Faulty starter relay
- Faulty starting circuit cutoff relay
- Faulty starter clutch

EB901000
INCORRECT ENGINE IDLING SPEED

ENGINE

Cylinders and cylinder head
- Incorrect valve clearance
- Damaged valve train components

Air filter
- Clogged air filter element

FUEL SYSTEM

Carburetors
- Faulty starter plunger
- Loose or clogged pilot jet
- Loose or clogged pilot air jet
- Damaged or loose carburetor joint
- Incorrectly synchronized carburetors
- Incorrectly adjusted engine idling speed (throttle stop screw)
- Incorrect throttle cable free play
- Flooded carburetor

ELECTRICAL SYSTEMS

Battery
- Faulty battery
- Discharged battery

Spark plugs
- Incorrect spark plug gap
- Incorrect spark plug heat range
- Fouled spark plug
- Worn or damaged electrode
- Worn or damaged insulator
- Faulty spark plug cap

Ignition coils
- Broken or shorted primary or secondary coils
- Faulty spark plug lead
- Damaged ignition coil

Ignition system
- Faulty ignitor unit
- Faulty pickup coil

EB902000
POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE

Refer to “STARTING PROBLEMS”.

ENGINE

Air filter
- Clogged air filter element

FUEL SYSTEM

Carburetors
- Faulty diaphragm
- Incorrect fuel level
- Loose or clogged main jet

Fuel pump
- Faulty fuel pump

EB903000
FAULTY GEAR SHIFTING

SHIFTING IS DIFFICULT

Refer to “CLUTCH DRAGS”.

SHIFT PEDAL DOES NOT MOVE

Shift shaft
- Incorrectly adjusted shift rod
- Bent shift shaft.

Shift drum and shift forks
- Foreign object in a shift drum groove
- Seized shift fork
- Bent shift fork guide bar

Transmission
- Seized transmission gear
- Foreign object between transmission gears
- Incorrectly assembled transmission

JUMPS OUT OF GEAR

Shift shaft
- Incorrect shift pedal position
- Incorrectly returned stopper lever

Shift forks
- Worn shift fork

Shift drum
- Incorrect axial play
- Worn shift drum groove

Transmission
- Worn gear dog

EB904000
FAULTY CLUTCH

CLUTCH SLIPS
Clutch
- Incorrectly assembled clutch
- Incorrectly adjusted clutch cable
- Loose or fatigued clutch spring
- Worn friction plate
- Worn clutch plate

Engine oil
- Incorrect oil level
- Incorrect oil viscosity (low)
- Deteriorated oil

CLUTCH DRAGS
Clutch
- Unevenly tensioned clutch spring plate
- Warped pressure plate
- Bent clutch plate
- Swollen friction plate
- Bent clutch pull rod
- Damaged clutch boss
- Burnt primary driven gear bushing
- Match marks not aligned

Engine oil
- Incorrect oil level
- Incorrect oil viscosity (high)
- Deteriorated oil

EB905001
OVERHEATING

ENGINE
Clogged coolant passages

Cylinder head(-s) and piston(-s)
- Heavy carbon buildup

Engine oil
- Incorrect oil level
- Incorrect oil viscosity
- Inferior oil quality

COOLING SYSTEM
Coolant
- Low coolant level

Radiator
- Damaged or leaking radiator
- Faulty radiator cap
- Bent or damaged radiator fin

Water pump
- Damaged or faulty water pump

Thermostat
- Thermostat stays closed

Oil cooler
- Clogged or damaged oil cooler

Hoses and pipes
- Damaged hose
- Incorrectly connected hose
- Damaged pipe
- Incorrectly connected pipe

FUEL SYSTEM
Carburetors
- Incorrect main jet setting
- Incorrect fuel level
- Damaged or loose carburetor joint

Air filter
- Clogged air filter element

CHASSIS
Brakes
- Dragging brake

ELECTRICAL SYSTEMS
Spark plugs
- Incorrect spark plug gap
- Incorrect spark plug heat range

Ignition system
- Faulty ignitor unit

EB906000
OVERCOOLING

COOLING SYSTEM
Thermostat
- Thermostat stays open

EB907000
POOR BRAKING PERFORMANCE

- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Faulty brake caliper piston seal
- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

EB908001
FAULTY FRONT FORK LEGS

LEAKING OIL

- Bent, damaged or rusty inner tube
- Damaged outer tube
- Incorrectly installed oil seal
- Damaged oil seal lip
- Incorrect oil level (high)
- Loose damper rod assembly bolt
- Damaged damper rod assembly bolt copper washer
- Damaged cap bolt O-ring

MALFUNCTION

- Bent or damaged inner tube
- Bent or damaged outer tube
- Damaged fork spring
- Worn or damaged outer tube bushing
- Bent or damaged damper rod
- Incorrect oil viscosity
- Incorrect oil level

EB909001
UNSTABLE HANDLING

Handlebars

- Bent or incorrectly installed right handlebar
- Bent or incorrectly installed left handlebar

Steering head components

- Incorrectly installed upper bracket
- Incorrectly installed lower bracket (incorrectly tightened ring nut)
- Bent steering stem
- Damaged ball bearing or bearing race

Front fork legs

- Unevenoil levels (both front fork legs)
- Unevenly tensioned fork spring (both front fork legs)
- Damaged fork spring
- Bent or damaged inner tube
- Bent or damaged outer tube

Swingarm

- Worn bearing or bushing
- Bent or damaged swingarm

Rear shock absorber assembly

- Faulty rear shock absorber spring
- Leaking oil or gas

Tires

- Uneven tire pressures (front and rear)
- Incorrect tire pressure
- Uneven tire wear

Wheels

- Incorrect wheel balance
- Deformed cast wheel
- Damaged wheel bearing
- Bent or loose wheel axle
- Excessive wheel runout

Frame

- Bent frame
- Damaged steering head pipe
- Incorrectly installed bearing race

EB910000

FAULTY LIGHTING AND SIGNALING SYSTEMS

HEADLIGHT DOES NOT LIGHT

- Wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Incorrectly grounded circuit
- Poor contacts (main or light switch)
- Burnt-out headlight bulb

HEADLIGHT BULB BURNT OUT

- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Incorrectly grounded circuit
- Faulty main switch
- Faulty light switch
- Headlight bulb life expired

TAIL/BRAKE LIGHT DOES NOT LIGHT

- Wrong tail/brake light bulb
- Too many electrical accessories
- Incorrect connection
- Burnt-out tail/brake light bulb

TAIL/BRAKE LIGHT BULB BURNT OUT

- Wrong tail/brake light bulb
- Faulty battery
- Incorrectly adjusted rear brake light switch
- Tail/brake light bulb life expired

TURN SIGNAL DOES NOT LIGHT

- Faulty turn signal switch
- Faulty turn signal relay
- Burnt-out turn signal bulb
- Incorrect connection
- Damaged or faulty wire harness
- Incorrectly grounded circuit
- Faulty battery
- Blown, damaged or incorrect fuse

TURN SIGNAL BLINKS SLOWLY

- Faulty turn signal relay
- Faulty main switch
- Faulty turn signal switch
- Wrong turn signal bulb

TURN SIGNAL REMAINS LIT

- Faulty turn signal relay
- Burnt-out turn signal bulb

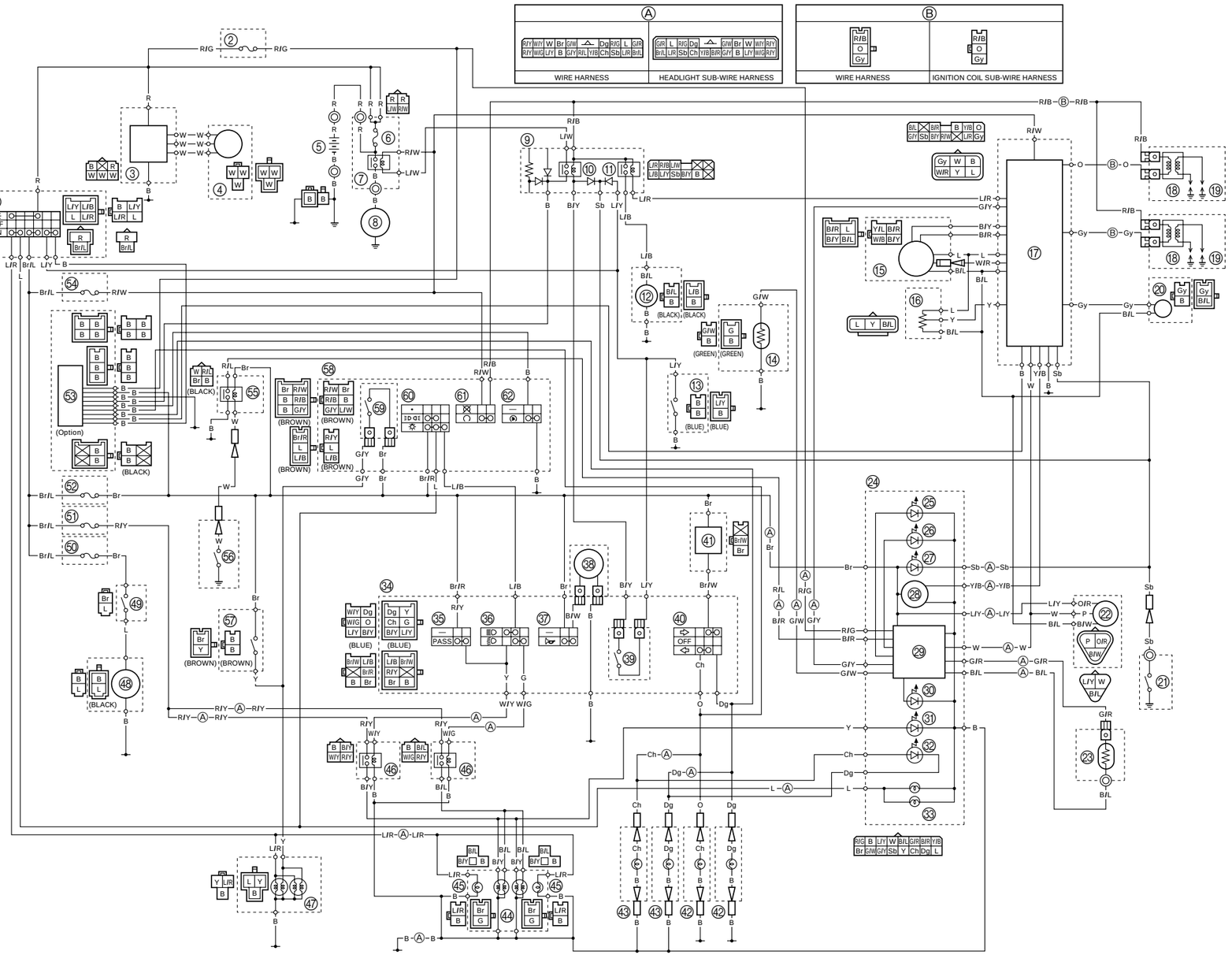
TURN SIGNAL BLINKS QUICKLY

- Incorrect turn signal bulb
- Faulty turn signal relay
- Burnt-out turn signal bulb

HORN DOES NOT SOUND

- Incorrectly adjusted horn
- Damaged or faulty horn
- Faulty main switch
- Faulty horn switch
- Faulty battery
- Blown, damaged or incorrect fuse
- Faulty wire harness

YZF-R1 WIRING DIAGRAM



COLOR CODE

B black	Sb sky blue	G/R green/red	R/L red/blue
Br brown	W white	G/W green/white	R/W red/white
Ch chocolate	Y yellow	G/Y green/yellow	R/Y red/yellow
Dg dark green	B/L black/blue	L/B blue/black	W/B white/black
G green	B/R black/red	L/R blue/red	W/G white/green
Gy gray	B/W black/white	L/W blue/white	W/Y white/yellow
L blue	B/Y black/yellow	L/Y blue/yellow	Y/B yellow/black
O orange	Br/L brown/blue	O/R orange/red	Y/L yellow/blue
P pink	Br/R brown/red	R/B red/black	
R red	Br/W brown/white	R/G red/green	

1. Main switch
2. Backup fuse (odometer)
3. Rectifier/regulator
4. Generator
5. Battery
6. Main fuse
7. Starter relay
8. Starter motor
9. Relay unit
10. Starting circuit cutoff relay
11. Fuel pump relay
12. Fuel pump
13. Sidestand switch
14. Fuel sender
15. EXUP servomotor
16. Throttle position sensor
17. Ignitor unit
18. Ignition coil
19. Spark plug
20. Pickup coil
21. Neutral switch
22. Speed sensor
23. Temperature sender
24. Meter assembly
25. Fuel level indicator light
26. Oil level warning light
27. Neutral indicator light
28. Tachometer
29. Combination meter
30. Coolant temperature meter
31. High beam indicator light
32. Turn signal indicator light
33. Meter light
34. Left handlebar switch
35. Pass switch
36. Dimmer switch
37. Horn switch
38. Horn
39. Clutch switch
40. Turn signal switch
41. Turn signal relay
42. Rear turn signal light
43. Front turn signal light
44. Headlight
45. Auxiliary light
46. Headlight relay
47. Tail/brake light
48. Radiator fan motor
49. Thermo switch
50. Radiator fan motor fuse
51. Headlight fuse
52. Signaling system fuse
53. CYCLELOCK (option)
54. Ignition fuse
55. Oil level relay
56. Oil level switch
57. Rear brake light switch
58. Right handlebar switch
59. Front brake light switch
60. Lights switch
61. Engine stop switch
62. Start switch